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# THE CONDOR

Volume 52 November-December, 1950 Number 6

JOURNAL OF THE COOPER ORNITHOLOGICAL CLUB

# THE CONDOR

## JOURNAL OF THE COOPER ORNITHOLOGICAL CLUB

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*Issued December 6, 1950*

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ROSE-THROATED BECARD
*PLATYPSARIS AGLAIAE*
One-half natural size
Painting by Andrew Jackson Grayson

THE CONDOR

VOLUME 52 NOVEMBER-DECEMBER, 1950 NUMBER 6

# BREEDING HABITS OF THE BARRED DOVE IN HAWAII WITH NOTES ON WEIGHTS AND SEX RATIOS

By CHARLES W. SCHWARTZ and ELIZABETH REEDER SCHWARTZ

The Barred Dove (*Geopelia striata*), a native of Malaya, has not only become successfully established in the Hawaiian Islands following its introduction in 1922 but has increased to the point where it is one of the most common birds in Hawaii today. It now occupies all suitable habitat on the major islands except for the island of Hawaii where its first occurrence dates to approximately 1935 and its ranges and populations are still increasing. Densities up to 800 Barred Doves per square mile are common; and in some places, particularly around water holes and in fields where a source of preferred food is abundant, concentrations may exceed a thousand birds. As a contribution toward an understanding of the phenomenal increase and spread of this species, the following observations on the breeding habits of the Barred Dove are presented. They were made during a survey of the game birds in the Hawaiian Islands conducted from February, 1946, through July, 1947, as the initial step in the Federal Aid-Wildlife Program (1-R) of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii (Schwartz and Schwartz, A Reconnaissance of the Game Birds in Hawaii, 1949).

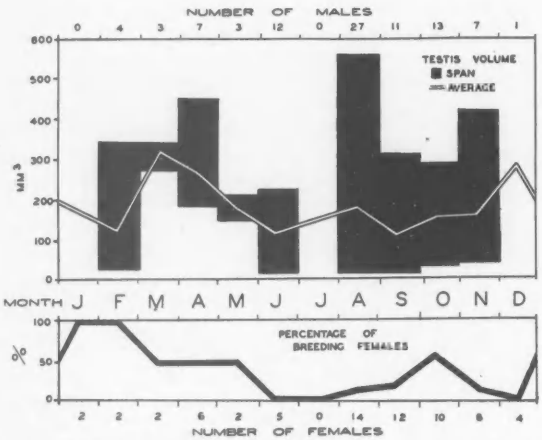
## BREEDING HABITS

Figure 37 presents the span and average volume of testes (roughly computed in cubic millimeters by measuring length $\times$ width $\times$ depth of both testes per individual) of 88 adult-plumaged male Barred Doves collected throughout the year. The percentage of breeding (determined by the presence of maturing Graafian follicles) in 67 adult-plumaged female Barred Doves collected during the same period is given in figure 38. These indications of breeding correspond very closely with observations on the courting displays and accompanying songs of male Barred Doves; the latter activities were observed at any time throughout the day but they were particularly common during the early morning hours. Singing became very intense during late January and reached a peak extending from February through April. From May through July songs were less evident but thereafter became more obvious and continued so through October. There was a decided decline in the amount of singing from November through early January. In every month we observed other indications of breeding, such as nests with eggs, nest-free juveniles, or (collected) adults with crops which indicated they were feeding squabs. Evidence from these sources suggests that Barred Doves in Hawaii breed throughout the year, but two periods of increased activity are evident.

This extensive breeding season is partly attributable to the equable climate in the range of this species in Hawaii which extends from sea level to 4,000 feet elevation. Here, mean annual temperatures grade from 75°F. at sea level to 60°F. at the highest occupied elevation, with a fluctuation of less than 8°F. in the monthly means throughout the year; and rainfall varies from less than 10 to 160 inches annually. However, the highest densities occur in the warmer and drier portions of this range where the foods preferred by this species are most abundant and where rainfall conditions are

seemingly more optimum for breeding. Probably mean annual temperatures lower than 60°F. and annual rainfall higher than 160 inches both limit the distribution of the Barred Dove in Hawaii (Schwartz and Schwartz, Wilson Bulletin, in press).

Barred Doves nest above the ground in shrubs or trees, including species planted for orchards or ornamental purposes as well as those occurring naturally. Six nests under our observation were located as follows: seven feet above the ground in the outer


NUMBER OF MALES
0 4 3 7 3 12 0 27 11 13 7 1
TESTIS VOLUME
SPAN
AVERAGE
MM 3
MONTH J F M A M J J A S O N D
PERCENTAGE OF BREEDING FEMALES
%
2 2 2 6 2 5 0 14 12 10 8 4
NUMBER OF FEMALES

Figs. 37 and 38. Breeding activity of the Barred Dove in Hawaii. Above (fig. 37), testis volume. Below (fig. 38), percentage of breeding females.

branches of a lime tree (*Tilia* sp.); four and eight feet above the ground, respectively, in the shrub koa haole (*Leucaena glauca*); seven feet above the ground in the outer branches of an alligator pear tree (*Persea americana*); eight feet above the ground in the outer branches of a mango tree (*Mangifera indica*); and eleven feet above the ground in the outer branches of a sandbox tree (*Hura crepitans*).

The nests were saucer-shaped, measuring between three and one-half and four and one-half inches in diameter. A basal platform was constructed of small twigs, rootlets, and tendrils or grasses between approximately one-eighth and one-sixteenth inch in diameter; and a meager lining was usually composed of finer material of the same nature (fig. 39). One interesting selection of materials occurred in a nest located at the animal quarantine station in Honolulu, Oahu. The nest platform was made of entire plants of Bermuda grass (*Cynodon Dactylon*) and lined with fine bits of steel fibers taken from a woven mesh screen used to shade the dog kennels from the sun. These steel fibers presented an appearance similar to tendrils used in other Barred Dove nests. Most nests are flimsily constructed and during strong winds are frequently reported to be destroyed or, as in the case of one nest under our observation, to have the eggs shaken out of them.

Measurements of eggs taken from four nests are as follows:

| | Egg 1 | Egg 2 |
|---|---|---|
| Nest 1 | 17 × 20 mm. | |
| Nest 2 | 19 × 21 | 19 × 21 mm. |
| Nest 3 | 18 × 25 | 18 × 24 |
| Nest 4 | 20 × 25 | 20 × 22 |

The weights and general external development of two nestling Barred Dove squabs from near hatching until ten days afterwards are presented here. On June 11, 1947, a Barred Dove nest was found approximately eleven feet above the ground in the outer branches of a sandbox tree. This is the nest described above with a sparse lining of steel fibers. It contained two eggs (measurements given under Nest 4 above) being incubated by an adult. The following day an incubating adult was observed on the nest.

Fig. 39. Adult Barred Dove incubating eggs. Wailua, Kauai, elevation 150 feet, February 26, 1947.

On June 13 at 7 p.m., an adult was flushed from the nest and an examination showed that one egg had hatched. Since the squab was quite damp, hatching was estimated to have occurred during that afternoon. There was no evidence of the egg shell in the nest or on the ground. A sparse covering of light yellow down marked the main feather tracts of the newly-hatched squab; the ventral surface down was slightly lighter than the dorsal. The skin of the head and body was dark brownish-purple; the bill was light pink with a dark purple ring near the tip which was white and possessed a small egg tooth. The feet were the same color as the bill but slightly darker. The eyes had not opened. The squab weighed 5.0 grams. The shell of the other egg was pipped.

On June 15 at 4 p.m., an examination of the nest showed that the second egg had hatched. From the development of this squab, we estimated that hatching had occurred on June 14. This younger squab weighed 8.4 grams; its eyes were still closed. The older

squab weighed 11.4 grams; its eyes were open but the bird frequently closed them. The sheaths of the primaries were slightly visible.

On June 17 at 5 p.m., the sheaths of the primaries and secondaries of the older bird were quite prominent; those of parts of the crown, dorsal body area, femoral tracts, scapulars, rectrices, and lesser wing coverts were clearly visible but less evident. The egg tooth was still present. The feet had changed to a slate-blue color. This bird weighed 16.0 grams. It exhibited an attempt at defense by raising the wing nearest the observer's intruding hand. On the younger squab, the sheaths of the scapulars, rectrices, and

Fig. 40. Squab of the Barred Dove six days after hatching. Note accumulation of droppings at edge of nest. Honolulu, Oahu, sea level, June 19, 1947.

femoral tracts were just appearing while those of the primaries and secondaries were more evident. This squab weighed 13.0 grams.

On June 19 at 4 p.m., the plumage of the primaries, secondaries, rectrices, and femoral tracts of the older squab was beginning to project from the sheaths (fig. 40). The bird weighed 25.0 grams. On the younger squab, sheaths marking most feather tracts were quite prominent. This bird weighed 22.0 grams.

On June 21 at 4 p.m., the feather development of the older bird was as follows: the plumage of the rectrices, dorsal body area, breast, and outer wing except the primary coverts was projecting about one-third from the sheaths. The juvenal plumage was just beginning to protrude from the sheaths on the crown; but on the remaining portion of the head, sheaths were only becoming prominent. The egg tooth was gone. This older squab was capable of perching easily on the observer's finger; its weight was 29.5 grams. The younger squab showed a similar plumage development except that the

plumage on the wings and body projected only about one-fourth from the sheaths and no feathers extended from the sheaths on the crown. The egg tooth was still present; the bird could only perch feebly on the observer's finger. This younger squab weighed 28.0 grams. The nestlings were beginning to fill the nest to capacity.

On June 23 at 5 p.m., both squabs were well feathered except for the facial region but they could still be told apart easily. The older bird now weighed 30.2 grams, the younger 30.4 grams. The upper surface of the wings showed the greatest development, the primaries and secondaries having lost most of their natal down plumes. The under

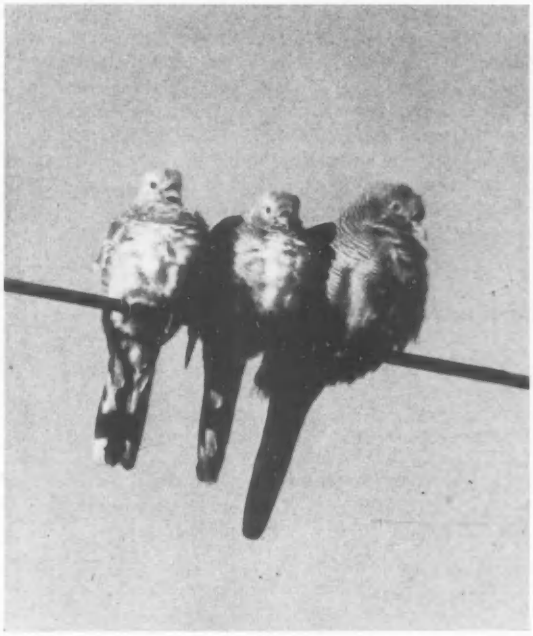


Fig. 41. Adult Barred Dove with two fledglings. Lihue, Kauai, elevation 200 feet, January 17, 1947.

surface of the wings were not yet feathered. By this time the bills had become brown but still retained a light tip. The egg tooth was gone on the younger squab. Both birds perched well and moved about the nest considerably.

On June 25 at 5 p.m., an observation of the nest disclosed that predation had occurred. Only the two wings, feet, gizzard, and some dried connective tissue remained of one bird. There was no trace of the other. From an examination of the wing bones which were broken and gnawed, we believe this predation to have been the work of a tree-climbing rat, either *Rattus rattus rattus* or *R. r. alexandrinus*. A comparison of the development of these two young at nine and ten days, respectively, after hatching with that of two other squabs at the time of their nest leaving leads us to believe that Barred Dove squabs leave the nest approximately fourteen days after hatching. Adults and their recently nest-free young, which are easily distinguished by size (fig. 41), are quite

commonly observed. One family of two adults and their two recently nest-free young under our observation stayed together for at least one week.

The fully-developed juvenal plumage is generally similar to the adult in pattern and coloration except that in the juvenile the contour feathers are lighter tipped, the primaries and primary coverts are distinctly redder, and the barring continues dorsally onto the top of the head and farther ventrally on the breast.

Twenty-five Barred Doves in juvenal plumage were examined for the bursa of Fabricius and all possessed a bursa measuring from 4 to 11 millimeters in length except one bird which had no bursa. Forty-one birds in adult plumage had no bursa while 14 others showed this structure measuring from 3 to 12 millimeters in length. Five doves in juvenal plumage were in breeding condition (determined by testis size compared to that of adults taken during the same month and by development of Graafian follicles in females). No examination for the bursa was made in three of these five (two females and one male) but one male had a bursa 4 millimeters in length while another male had no visible bursa. Riddle (Am. Jour. Physiol., 86, 1928:248-265) found in other kinds of doves (genus *Streptopelia*) that the bursa of Fabricius usually, but not invariably, involuted at sexual maturity. In our examination for bursae in both adult-plumaged and juvenal-plumaged birds, we found no correlation between bursal length or absence and the condition of molt of the wing primaries.

## WEIGHTS AND SEX RATIOS

The weights of forty-six Barred Doves are as follows:

| | Average | Minimum | Maximum |
|---|---|---|---|
| 20 adult-plumaged males | 59.7 grams | 54 grams | 65 grams |
| 10 adult-plumaged females | 55.2 | 51 | 61 |
| 5 nest-free juvenal-plumaged males | 53.8 | 50 | 61 |
| 11 nest-free juvenal-plumaged females | 51.2 | 42 | 59 |

Sex ratios obtained from 207 Barred Doves in Hawaii are as follows:

| | Number of males | Number of females | Males per 100 females |
|---|---|---|---|
| 207 adult-plumaged and nest-free juvenal plumaged doves | 111 | 96 | 115 : 100 |
| 156 adult-plumaged doves | 89 | 67 | 132 : 100 |
| 51 nest-free juvenal-plumaged doves | 22 | 29 | 75 : 100 |

## SUMMARY

Barred Doves breed throughout the year in Hawaii but two periods of increased activity occur.

The development of two squabs from hatching until ten days afterwards is described.

Juvenal-plumaged birds show lighter-tipped contour feathers and redder primaries and primary coverts than adult-plumaged birds. Both juvenal-plumaged and adult-plumaged birds were found to possess a bursa of Fabricius. Lack of the bursa also occurred in both groups.

The average weight of 20 adult-plumaged males was 59.7 grams and of 10 adult-plumaged females was 55.2 grams.

The sex ratio in 207 adult-plumaged and nest-free juvenal-plumaged birds was 115 males : 100 females.

*Conservation Commission, Jefferson City, Missouri, May 30, 1950.*

# INHIBITION WITH PROLACTIN OF LIGHT-INDUCED GONAD INCREASE IN WHITE-CROWNED SPARROWS

By ROBERT E. BAILEY

The ability of light to stimulate the gonads in many birds is now well known (see reviews of Burger, 1949; Bissonnette, 1936 and 1937; Rowan, 1938). Practically all experiments concerned with the role of light have been focused upon the ability of birds to respond to increased day length. Few data related to the return to a non-breeding condition have been reported. The demonstration of a refractory period (Riley, 1936; Wolfson, 1945; Miller, 1948) for a time following the breeding activities indicates that a mechanism is in operation which prevents the bird from responding to light and thus permits a "rest" before the bird returns to breeding condition. The stages in the annual cycle in birds may be briefly and tentatively outlined as follows: (1) Following the breeding season, adults and young (the latter questionably in some species) are refractory to light; that is, the normal action or release of gonadotropins by the pituitary is in some way blocked. (2) At a certain time in the autumn the refractoriness ends. The gonads, however, remain quiescent since the days are not long enough to stimulate the pituitary. (3) With increased day length in the late winter and early spring the pituitaries are again stimulated and by spring are releasing gonadotropins sufficient to bring the birds into full breeding condition.

Little explanation of the physiological basis for refractoriness has been presented. Miller (1949) has suggested that it is the pituitary which is refractory, since he was able to stimulate the testes of male Golden-crowned Sparrows (*Zonotrichia coronata*) during the refractory period with injections of pregnant mare serum (gonadin). It is possible that the failure of the pituitary to respond to light during this period may be explained on a hormonal basis, and for this reason the following experiments were undertaken to test to what degree injection of prolactin is able to duplicate the conditions existing during the refractoriness. The choice of this hormone is based upon experiments showing that prolactin causes gonadal regression in adult pigeons and fowl (Riddle and Bates, 1933; Bates, Lahr, and Riddle, 1935).

The prolactin used in these experiments was kindly supplied by Dr. William R. Lyons, Division of Anatomy, University of California, and Dr. A. F. Langlykke of E. R. Squibb and Sons (Luteotrophin Squibb). I am indebted to Dr. O. P. Pearson of the Museum of Vertebrate Zoology for his guidance and encouragement during this work.

## METHODS

Two experiments were undertaken, the second primarily because no injected controls were used in the first. The methods in both were essentially the same. Wintering White-crowned Sparrows (*Zonotrichia leucophrys pugetensis*) were trapped on the University of California campus and confined, in groups of 8 to 10, in cages two feet by two feet by three feet. The birds were illuminated continuously with incandescent light and provided with ample food (bird seed, pablum, and fresh vegetables) and water. The experimentals were injected with 15 I. U. (as 0.075 ml of an aqueous solution) of prolactin. The injected controls were given 0.075 ml of a 2 per cent aqueous solution of albumin daily. In both groups the injections were subcutaneous. The normal controls were subjected to the same light and environmental conditions as the other birds but were not injected.

From time to time, in both experiments, birds were sacrificed to determine the

progress made by the gonads, and on the day following the last injections the remaining birds were killed and autopsied. The dimensions of the testes were taken and then these, along with the ovaries, were fixed in Bouin's fluid or formol-sublimate. The gonads of all the birds used in the first experiment and about half of those in the second were sectioned at 10 micra and stained with Delafield's hematoxylin and eosin.

The first experiment was started on December 23, 1949, using 8 experimentals and 10 normal controls. All these birds had been captured on either December 17 or 20. The injections were continued until January 15, 1950, and the birds were sacrificed on January 16. The duration of the experiment was 25 days.

The second experiment began on February 3, 1950. On this date 37 birds were captured; 10 were immediately examined, 9 were used as experimentals, 9 as injected controls, and 9 as normal controls. This experiment was concluded on the 17th day, February 20, 1950.

The majority of the birds used were males and consequently emphasis has been placed on testis size to indicate the results of the experiments. The volume of each testis was computed from the formula for the volume of an ellipsoid, $V = 4/3\pi\ ab^2$, where $a = \frac{1}{2}$ the longest diameter and $b = \frac{1}{2}$ the shortest diameter. The mean testis volume for each group was also determined.

## RESULTS

*Testis volume.*—In the first experiment 4 controls and 6 experimentals were males. The testis volume of the two controls remaining at the end of the experiment were 106.8 $mm^3$ and 44.39 $mm^3$ (avg. 75.6). The mean testis volume of the 5 remaining prolactin-injected birds was 6.31 $mm^3$, one-twelfth that of the controls (see fig. 42, left).

The average testis volume of the 7 males collected in the field at the beginning of the second experiment was 1.237 $mm.^3$ At the end of 17 days, the average volume for the experimentals was 6.21 $mm^3$; for the albumin-injected controls, 26.4 $mm^3$; and for the normal controls, 23.9 $mm.^3$ The testis volume of the prolactin-injected birds was 5 times greater than the original size and the albumin-injected and normal controls were about 20 times greater. The testis volume of the two types of controls was not significantly different. Together these showed an increase of about 4 times over the prolactin-injected birds (fig. 42, right).

The young of the Puget Sound race of White-crowned Sparrows normally breed in the first spring following hatching and at that time are indistinguishable from the older birds (Blanchard, 1941). Since the present experiments were conducted before the prenuptial molt was completed, it was possible to distinguish the young birds, but no differences between the response of these and older birds were found.

*Tubule size and spermatogenesis.*—Sections of all the testes from the first experiment and some of those from the second were examined and revealed that the size of the seminiferous tubules and the progress of spermatogenesis were closely correlated with testis size. The tubules of the controls were considerably larger than those of the prolactin-injected birds (fig. 43, a and b). Spermatogenesis was also more advanced in the controls than in the experimentals. The average tubule size for the 6 experimentals in the first experiment was 78 micra. Most of these showed only a few primary spermatocytes and one showed a few secondary spermatocytes. The average tubule diameter of the two controls in the first experiment was 255 micra and both showed spermatids and one a few mature sperm.

*Follicle size.*—In both experiments prolactin inhibited almost completely the development of ovarian follicles (fig. 43, c and d). Follicles measuring 0.5 to 1.3 mm in

diameter could be seen with the naked eye in the ovaries of all controls, but the ovaries of the prolactin-injected birds had to be sectioned to reveal the small and often atretic follicles. The average size of the largest follicle of the three injected females in the first experiment was 265 micra. The average largest follicle of the 5 controls was 1021 micra.

*Interstitial cells.*—Not enough is known concerning the interstitial cells of birds to permit any interpretation of the response of these elements. A few observations which may bear on the secretion of sex hormones by the gonads, however, were noted. After

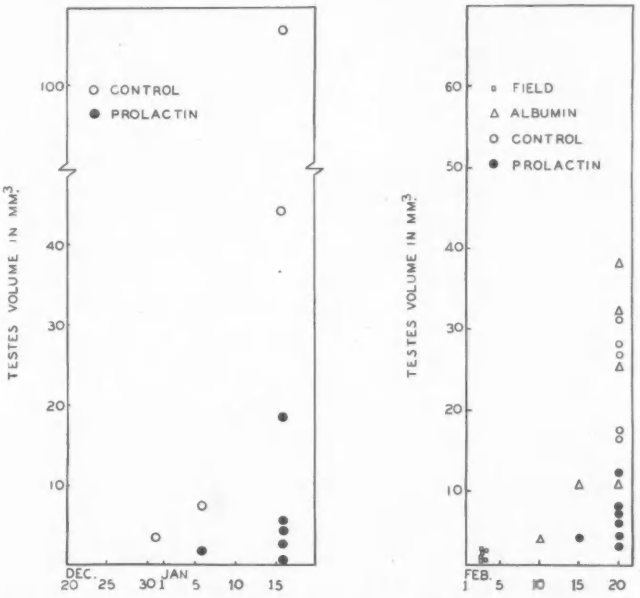



Fig. 42. Left, testis size of experimental and control White-crowned Sparrows in first experiment. All birds subjected to continuous artificial light from December 23, 1949, to January 15, 1950; experimentals received prolactin daily.

Right, testis size of experimental and control White-crowned Sparrows in second experiment. All birds except those denoted by the small squares (which were sacrificed immediately) subjected to continuous artificial light from February 3 to February 20, 1950. Normal controls untreated; injected controls received albumin daily; experimentals received prolactin daily.

about the thirteenth day of the first experiment and during the last few days of the second, loud singing was heard coming from the controls. Although this singing by the controls was noted on numerous occasions, it was never observed among the prolactin-injected birds. If the secretion of sex hormones is responsible for the loud and persistent singing of breeding birds, the absence of singing in the prolactin-injected group is possible evidence that the sex hormone-secreting elements were being inhibited. The oviducts of the female controls had increased considerably in size over those of the prolactin-injected birds. This would again suggest that prolactin is inhibiting, through some mechanism, the secretion of sex hormones. This latter response has previously been demonstrated by Bates, Lahr, and Riddle (1935) in chickens.

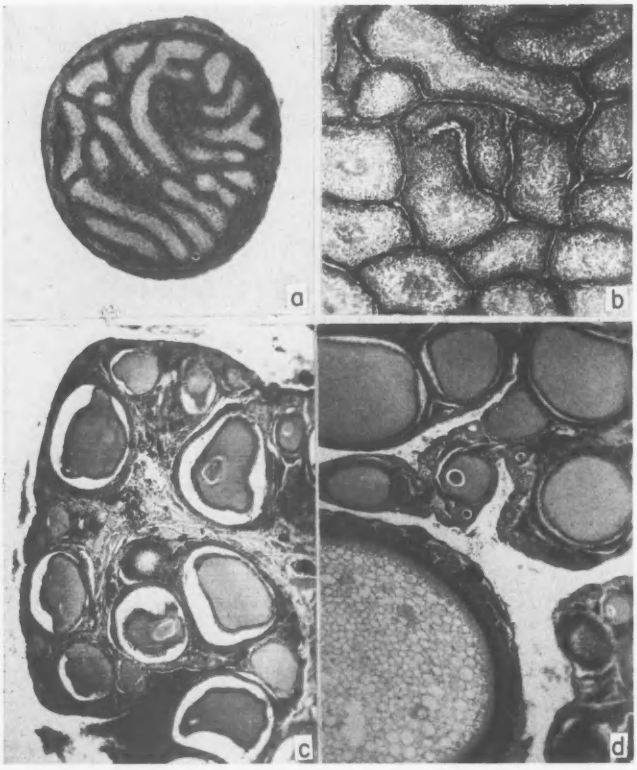



Fig. 43. (a) Testis of White-crowned Sparrow subjected to continuous light and injected with prolactin daily from December 23, 1949, to January 15, 1950. (b) Same as "a" without daily injections of prolactin. (c) Ovary of White-crowned Sparrow subjected to continuous light and injected with prolactin daily from December 23, 1949, to January 15, 1950. (d) Same as "c" without daily injections of prolactin. All figures 61×.

## DISCUSSION AND CONCLUSIONS

In their work on the anti-gonadal activity of prolactin, Riddle and his associates used adult pigeons and fowls, forms which have lost to a considerable degree the cyclic reproduction characteristic of most wild birds. Their birds were in breeding condition at the time of the experiments and the response to prolactin was measured by the amount of gonadal regression. The testes of adult pigeons were reduced in size by about 90 per cent after injections for 10 days, and the formation of large follicles in the ovaries was stopped while those already formed were resorbed.

In the present experiment it was demonstrated that prolactin is capable of inhibiting light-induced recrudescence of the gonads of White-crowned Sparrows. The interest lies primarily in the ability of prolactin to exert its influence in the face of a supposedly strong stimulus to the pituitary, namely, light. Bates, Riddle, and Lahr (1937) showed that when follicle stimulating hormone was injected simultaneously with prolactin, the

action of the latter on the gonads was overcome. This is strong evidence that prolactin, in some way, blocks the secretion of gonadotropins by the pituitary. This may be quite similar to the situation existing during the refractory period, for at this time it appears that it is the pituitary which is refractory and not the gonads (Miller, 1949).

While it has been shown that prolactin is probably physiologically capable of being the hormone responsible for refractoriness in birds, only a suggestion of this mechanism is possible at present. The prolactin content of the pituitary over the entire year must be determined and correlated with the events of the annual cycle, particularly the onset, duration, and termination of the refractory period.

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*Museum of Vertebrate Zoology and Department of Zoology, University of California, Berkeley, California, July 25, 1950.*

# THE PALE RACES OF THE STELLER JAY

By ALLAN R. PHILLIPS

Few birds have been as much discussed with as wide disagreement as the pale races of the Steller Jay (*Cyanocitta stelleri*). Within the area from northern Utah to Zacatecas, Mexico, four names have been used in recent years, and all four have been applied, by different authors, to birds taken in Arizona. In 1946, through the courtesy of the late Max M. Peet and the authorities of the United States National Museum, the Fish and Wildlife Service, the American Museum of Natural History, and the University of Michigan Museum of Zoology, I examined a number of specimens, but concluded that it was impossible to understand their taxonomy, nomenclature, and migrations without further collecting. This has now been done, and the present review is based on recently collected material, including additional specimens borrowed from the universities of Utah and Arizona, the Museum of Comparative Zoology, the Museum of Vertebrate Zoology, Carnegie Museum, the Dickey Collection at the University of California, Grand Canyon National Park Museum, and the collections of I. N. Gabrielson, Lyndon L. Hargrave, and Gale Monson, to all of whom I am likewise greatly indebted. An especially critical series from Nevada was made available by Warren M. Pulich.

Fundamental considerations in the geographic variation of this jay are the facts, first, that back color varies widely with wear (season and age) and with museum age; second, that blue feathers, in this as in all species with any blue studied by me, are palest when first grown and become darker with wear; and, third, that adults tend to have longer crests, wings, and tails than immature individuals, and males average larger than females, but the differences are less pronounced than in certain other corvids. Lists of specimens examined will be limited to those used in the final stages of this study and include a larger amount of recently collected material than was available to me earlier.

Previous authors have concluded that the palest populations of *stelleri* inhabit Durango, Zacatecas, and Jalisco (Ridgway, Birds N. and M. Amer., part 3, 1904:359); or southern Nevada and southwestern Utah (Behle, Bull. Univ. Utah, 34, 1943:48); or Colorado, New Mexico, Arizona, and extreme northern Sonora (van Rossem, Pac. Coast Avif. No. 24, 1936:33; see also other papers of van Rossem cited below). As regards size, we are told that Mexican birds average about 20 mm. shorter in wing length than do specimens from New Mexico and Colorado (van Rossem, Bull. Mus. Comp. Zool., 77, 1934:453), and similar trends are noted by Ridgway (*loc. cit.*) and Oberholser (Proc. Biol. Soc. Wash., 50, 1937:118); whereas Behle (*loc. cit.*) concludes that there are no appreciable size differences in these races. The backs of specimens from Arizona and New Mexico are described in various terms, all of which incorrectly emphasize a brownish cast.

While the Steller Jay apparently performs no regular migrations, it is not entirely sedentary. Its movements are less conspicuous than those of the Blue Jay (*Cyanocitta cristata*), but in some years individuals or even flocks appear at points more or less remote from the breeding range. Presumably most such movements are southward, but Hough (Condor, 51, 1949:188) records a bird which had evidently moved nearly 400 miles due north. We know virtually nothing about these movements.

Three races appear to be usefully recognizable in the region in question, even though none is 100 per cent separable from the others:

### Cyanocitta stelleri macrolopha Baird

*Cyanocitta macrolopha* Baird, Proc. Acad. Nat. Sci. Phila., 7:118, June, 1854 (100 miles west of Albuquerque = Agua Fria Spring [now Paxton], Zuni Mts., New Mexico).

*Cyanocitta stelleri percontatrix* van Rossem, Trans. San Diego Soc. Nat. Hist., 6:328, June 5, 1931 (Hidden Forest, Sheep Mts., Clark Co., Nevada).

*Cyanocitta stelleri cottami* Oberholser, Proc. Biol. Soc. Wash., 50:117, 1937 (Provo, Utah).

*Diagnosis.*—A race of the interior series, with white head markings; decidedly paler than the northern, coastal, or far-southern races, including *annectens*, yet darker both above and below than the birds of central and southern Arizona and adjacent Sonora and averaging slightly larger.

*Measurements.*—Seven adult males: wing (chord) 149-158 mm. (average, 154.8 in northern Utah, 151.7 in Zuni Mts.); tail 135.0-158.5 (averages, 148.0 and 136.9, respectively). Three adult females: wing 144.2-150.3, tail 131.8-141.4 mm.

*Range.*—Northern Utah and Colorado south to southern Nevada, southwestern Utah, and the mountains of central northern New Mexico. Sporadically south in winter nearly, if not quite, to the Mexican border, and across that line in 1893-4 (Sonoyta, Sonora).

The application of the name *macrolopha* has been uncertain. Baird's type, taken by Kennerly and Möllhausen on November 17, 1853, was later mounted and therefore cannot be relied upon for color comparisons. It was described a few years later as "dark ashy brown with a gloss of greenish" on the back (Baird, Cassin and Lawrence, Pacific R. R. Repts., 9, 1858:582), but it is now pale. In the absence of other topotypes, I made a special trip at the same season (November 26, 1946) to the type locality and secured three adults which agree in measurements with the type (an unsexed adult). These specimens, which may be considered "neotypes," confirm the dark color mentioned by Baird, and *macrolopha* thus becomes the proper name for the race later named *cottami*.

Specimens from northern Utah agree well in color with the three neotypes. Those from southern Nevada and southwestern Utah seem more variable, a proportion of them (especially in the Pine Valley Mts.) being near the next race, but on the whole they are best associated with *macrolopha*. This agrees with the conclusions of van Rossem (Pac. Coast Avif. No. 24, 1936:34), whose only error was in using specimens from extreme southern Arizona as representative of *macrolopha*.

Size differences are matters of averages, at most. While other populations do not give such large measurements as the four adult males and two adult females from northern Utah, these are probably not truly representative. Of the four immature specimens measured from northern Utah, the largest, although sexed as a female, is the type of *cottami*. The difference between averages from southern Arizonan specimens and southern populations of *macrolopha* is a mere three or four millimeters in both wing and tail. The figures given above are based on specimens from northern Utah and the Zuni Mountains only and not on any from farther southwest, where less typical *macrolopha* occurs. The respective type specimens measure: *macrolopha*, wing 151.0, tail 137.5; *cottami*, 152.0, 141.3 mm.

*Specimens recently examined.*—ARIZONA, 5: near Eagar, Oct. 18, 1934; White Mts., Sept. 26 and Nov. 26, 1936; east of Flagstaff, Jan. 26, 1936; Burnt Ranch, near Prescott, Jan. 8, 1926. CALIFORNIA, 1: near Blythe, Feb. 23, 1935. NEVADA, 9: Charleston Mts., Feb. 5, 1931, Aug. 13, 1932, Sept. 26, 1930 (2), Oct. 21, 1949 (5). NEW MEXICO, 19: Zuni Mts., Nov. 26, 1946 (3), near Santa Fe, Nov. 10, 1947; near San Antonio, Jan. 2, 1942; Organ Mts., Feb. 25, 1920; near Las Cruces, Jan. 17 (4) and 20 (3), 1920, Feb. 6 (2) and 17 (3), 1920, and Apr. 23, 1920. TEXAS, 1: "Frijole," 8500 feet alt., Jan. 1, 1939. UTAH, 20: Uinta Mts., July 2, Aug. 28 (2), and Sept. 13 and 15, 1937; 20 mi. SW Duchesne, June 19, 1937; east of Ogden, Sept. 10, 1943 (2); Silver Lake P. O., Salt Lake Co., Sept. 10, 1947; White Mt., Sevier Co., Oct. 19, 1941; Zion Canyon, no date; Pine Valley Mts., Oct. 14 (2) and 20, 1937, and Sept. 13, 1941 (6). Total, 55 specimens.

### Cyanocitta stelleri browni, new subspecies

*Type.*—Adult male, no. 731, collection of Allan R. Phillips, taken in Carter Canyon, near Summerhaven, Santa Catalina Mountains, Arizona, September 21, 1947, by A. R. Phillips, original number 1163.

*Diagnosis.*—Very similar to both *C. s. macrolopha* Baird and *C. s. diadematа* (Bonaparte), but averaging paler than either and very slightly smaller than the former. As compared with *macrolopha,* the difference is most distinct on the back, chest, breast, and belly, but the rump, wings, and tail also average a little paler.

*Measurements.*—Twelve adult males: wing 141.7-151.5 (average, 148), tail 125.2-140.7 (134). Seven adult females: wing 141.3-146.0 (142.7), tail 127.7-133.5 (130.7). Six immature males: wing 141.8-147.0 (144), tail 128.0-136.4 (130).

*Range.*—Mountains of Arizona generally, and southern and presumably central New Mexico south to western Texas (Davis Mountains), northern Chihuahua, and northern Sonora (San José Mountains and Los Pinitos). Winter visitor irregularly in adjacent lowlands.

This race may appropriately be dedicated to Herbert Brown, the pioneer resident naturalist of the inland southwest. Its distribution probably extends into extreme southern Utah at Navajo Mountain; specimens from adjacent localities in Arizona are distinctly closest to *browni,* a conclusion already announced by Woodbury and Russell (Bull. Univ. Utah, 35, 1945:86). To the west, however, the range of *browni* is more restricted, including the Prescott area and the Hualpai Mountains, but perhaps no farther north. A single specimen from the Juniper Mountains, one from near Jacobs Lake on the Kaibab Plateau, and two from near Frazier Well (Hualpai Indian Reservation), all taken in October and early November, 1948, are as near one race as the other. Like other indeterminate specimens, therefore, they are not included in the list of specimens examined. Birds from central southern Arizona are most typical.

*Specimens recently examined.*—ARIZONA, 51: Hualpai Mts., Nov. 28 (2) and Dec. 2, 1947, Aug. 27 and 29 and Sept. 29 (3), 1948, and Sept. 15, 1949; Prescott, Aug. 2, 1928; South Rim of Grand Canyon, Aug. 14, 1941; near and east of Flagstaff, Dec. 9, 1931, and Nov. 26, 1936; Betatakin Canyon, Tsegi Canyons, Navajo National Monument, Jan. 14, 1938; Tsailee Camp, Lukachukai Mts., May 25, 1935; near Eagar, Apr. 1, 1935; White Mts., Sept. 15 and 16 (2), 1934, Oct. 2 (2), 1934, Mar. 8 and 27, 1935, Sept. 15, 1936, Oct. 6 and 7, 1936, and Dec. 14, 1936; near Granville, below Blue Range, May 6, 1935; Chiricahua Mts., Nov. 15, 1948 (2); Huachuca Mts., April 20 and 29 (2), 1937, and May 13, 1938; near Patagonia, Jan. 17 and Mar. 5, 1948; Santa Rita Mts., July 6, 1932, Nov. 13, 1948, and Aug. 26, 1949; Santa Catalina Mts., June 5, 1933, Aug. 31 and Sept. 3, 1938, Sept. 21 and Dec. 28, 1947, Aug. 19 and Sept. 4 (2), 1949, and Feb. 9, 1950; near Tucson, Dec. 20, 1943; Phoenix, Oct. 27, 1943; Camp Creek, northeast of Phoenix, Dec. 2, 1934. NEW MEXICO, 2: West Pueblo Creek, Catron Co., May 18 and 19, 1937. Total, 53 specimens.

### Cyanocitta stelleri diadematа (Bonaparte)

*Cyanogarrulus diadematus* Bonaparte, Consp. Avium, 1:377, May 6, 1850 [= Feb. 3, 1851] (Zacatecas, Mexico).

*Diagnosis.*—Similar to the preceding two races, but darker below. According to van Rossem (Bull. Mus. Comp. Zool., 77, 1934:453) "darker throughout, with the dark color of the pectoral region extending well down onto the chest," and averaging slightly smaller. The size difference is insignificant; lack of proper material makes it impossible for me to verify any differences in dorsal coloration, but Durangan specimens are dark below and apparently on the crown-streaks. I therefore follow the A.O.U. Committee (Auk, 63, 1946:430) in accepting this separation.

*Measurements.*—"Males" average 142.5 mm. in wing length (van Rossem, *loc. cit.*).

*Range.*—Sierra Madre Occidental from southern Sonora and Chihuahua south to Zacatecas, Jalisco, and Nayarit.

The dark birds that occur in the southernmost United States in winter are generally small, and should be compared with *diadematа.* I have seen little material from Mexico, and Mexican specimens in good plumage seem to be scarce in collections. No specimens of this race have been examined recently.

*Museum of Northern Arizona, Flagstaff, Arizona, March 26, 1950.*

# OBSERVATIONS ON THE LAWRENCE GOLDFINCH

By JEAN M. LINSDALE

My interest in the Lawrence Goldfinch (*Spinus lawrencei*) has been held by the small size of its range, the irregularity of its occurrence, its affinity for hot and dry situations, the prominence of seeds of native plants in its food, its dependence on water, the permanence of the flocks, the long period through which the birds are paired, and the peculiarities in its nesting that appear to be related to these traits.

This bird's range is restricted mainly to a small part of California. It nests southward from Shasta County to Lower California. In winter some flocks remain as far north as San Francisco and some move southeastward as far as western New Mexico. In summer it is not common, especially northward, and its numbers in one place vary considerably from year to year. Its distribution is discontinuous and the time and place of its movements are irregular.

On the Hastings Reservation in Monterey County, California, numerous observers have studied this goldfinch. The longest sessions of watching were by John A. Gray, Jr., Henry A. Hjersman, and David Lack. Our observations make us think that the kind and amount of seeds produced each year are important in determining the numbers of goldfinches and the length of their stay. The native plants in this instance seem to be eaten more than others, although a few introduced species have been eaten heavily. The changes in vegetation, especially the reduction in some of the weedy species, and the trend toward stabilization have paralleled the reduction in number of goldfinches. Search for particular kinds of seeds takes the birds to varied kinds of habitat. We see the species in winter in the chamisal and where there is water along intermittent creeks. In spring it ranges over open ground wherever abundant small seeds are produced. In the nesting season the birds go to the hills where there are oaks, mainly live oak and blue oak.

This goldfinch has a special predilection for seeds of the Boraginaceae. That family is represented by 21 native species on the Reservation. Some of these, especially the common fiddleneck, grew abundantly in the deserted hayfields for several years after the last cultivation. Those were the years when the Lawrence Goldfinch was most abundant. Recently, when the patches of fiddleneck became smaller, the number of nesting goldfinches also became smaller. Continuous watching from early April to late July indicated greater dependence on this one source of food than on any other. Almost invariably at that season a feeding goldfinch is on a fiddleneck plant.

Birds that feed so exclusively on dry seeds as the goldfinches do apparently have greater need for water to drink than other kinds. Between feeding periods they assemble at watering places where they drink, sing, bathe, preen, rest, and sun themselves. On the Reservation they go to the pools in creeks, to water troughs, and to springs. Usually there are trees closeby where they perch between trips to water. Willows and oaks serve most frequently.

Many kinds of sparrows flock for a part of the year, but few are so persistent in the permanence of their flocks as the Lawrence Goldfinches. Even in their nesting the flocking tendency is evident in the grouping of the nests and in the foraging of the males. Courtship serves to establish and maintain the bond between the members of the pair, and we see examples of it in many stages and under many conditions. Attachment to the flock and to the mate is exhibited at the same time in varying degrees in different stages in the nesting. The expression of tolerance and of intolerance is directed also toward closely related species.

Special conditions favored the watching of goldfinch behavior in the spring of 1938.

Favorable food plants in abundance on open ground previously cultivated attracted a large flock of foraging fringillids—mainly Lawrence Goldfinch, Green-backed Goldfinch, House Finch, Oregon Junco, and Lark Sparrow. From 50 to 200 Lawrence Goldfinches were present daily for nearly a month, beginning in the middle of March. The largest numbers of birds on this south-facing slope foraged in the afternoons. The foraging was interrupted at intervals when the whole flock would fly up to a fence or to a nearby, isolated blue oak. Most of the singing took place in the tree. There were indications that the goldfinches were already paired. When they rested in the tree, they usually faced the sun and sang, and the nearest bird to a perched male was usually a female.

When a feeding flock of 15 to 20 Lawrence Goldfinches with a few Green-backs was disturbed on a morning in May, the birds flew to a low bushy willow where they perched in pairs. Ten or more times males flew at other males in efforts to drive them from the near vicinity of a female. This was always a Lawrence driving away another male of the same species except once when a male Green-back was driven. Usually a move of only 5 or 6 feet was required for the pursued bird to avoid another drive. Both birds would then settle on perches again. This behavior occurred on the feeding grounds that were far from the nest sites. In another pair on feeding grounds in late May the male followed three feet behind the female. When they landed and began to eat fiddleneck seeds, the male was more vigilant than the female.

There was further indication of courtship on June 1 among twenty goldfinches perched along a fence. In a pair on the top wire the male was twenty inches from the female, and he was singing a low song barely audible ten feet away. Another female lit on the wire fifteen feet away and immediately the male changed his behavior. He became attentive and assumed a pose in which the body was slender with neck and head extended in a line in striking attitude. He began to sidle toward the newly arrived female. The original female then began to pay attention to the performance and flew to a perch almost directly below the intruder, which departed. On another June morning a male and two females were together. The male sang to both females and both females postured. The females followed the male to a creek where all three drank. After one female flew off, the male continued to sing and posture before the other female.

Nesting on the Hastings Reservation extends from May to July. The birds go to hillsides a quarter to a half mile from the normal feeding areas. The nests usually are in blue oaks that are heavily festooned with lichens (*Ramalina reticulata*), and they are placed about twenty feet above the ground. Lichens make up most of the material in the nests.

Building is by the female only, but the male is nearly always close by. The birds of the pair are markedly aware of each other. The male sings while the female builds, and he nearly always follows her when she leaves the nest tree, but he does not go on trips to nearby trees. The male seems to know where the female is going, and he appears distressed when she is not close by. The trips are likely to be in a different direction each time. The lichen is picked from the branches of trees, sometimes from a part of the nest tree. One female took material from directly above her head while she was on the nest and then carried it around in the tree and back again. She repeated this twice.

Toward the end of nest building one female brought only very small objects, but she spent much time working around the nest and pressing her body against the sides. Once, she worked at the nest for five minutes before she came out on to a branch. Half an hour later she was collecting material from trees 30 to 50 feet away, and she returned quickly at 3-minute intervals. In midmorning she brought feathers to the nest; previously she had brought only plant material. A flight call by the female was the signal

that caused the male to follow her in trips from the nest. This call was uttered on distant flights, but not on ones to nearby trees. In one example the female left the nest, twittered twice, and was answered by the male; then the female flew off twittering, and the male followed her.

In the last days of nest building the male sang mainly while the female was working. He sang in flight when following the female, but more persistently when perched near her at the nest. On one morning the song was spontaneous and not in answer to any other male. It was delivered from many branches in the nest tree, but not from other perches. When a strange male followed the pair back to the nest, he settled and sang within a yard of the nest, but the nest male, only two yards away, paid no attention to the intruder.

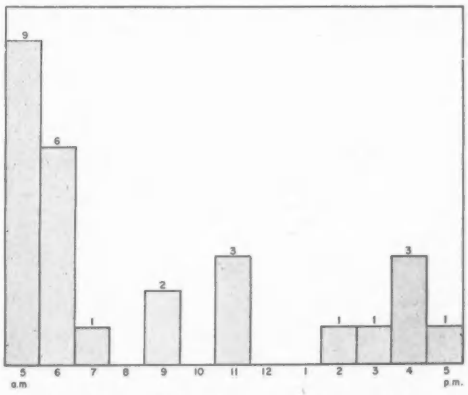


Fig. 44. Hourly occurrence of 27 trips away from nest by an incubating female Lawrence Goldfinch in period from May 26 to June 11, 1939.

The next morning the male had enlarged the space from which he attempted to drive out strange males. The chases were mild compared to those of some other species, but the results were alike. After the male fed the female three times, he went to the nest and sang quietly. The female went to the nest and the male sang close by. Then the male suddenly left the nest tree and flew, singing, to a bush twelve yards off. He chased another male from there and then drove him from another perch. The nest male returned and sang hard in the tree next to the nest. He then sang in flight to a tree ten yards in another direction and twice chased off a male that had settled there, singing at the same time. He had made two flights to separate trees to chase males from the vicinity of the nest and had left his mate to do so.

On these mornings there were numerous instances when a member of the pair drove off a strange goldfinch. The male was quick to chase other males. The female pursued other females and sometimes strange males. At least twice a male Green-backed Goldfinch came into the nest tree and neither member of the pair took notice of it. Sometimes the male flew off and there was a pursuit that could not be traced clearly. Such a flight might involve the four birds of two pairs, but usually it was mild and one bird or pair would leave. Sometimes another pair would be in the near vicinity of the nest for as long as five minutes and the owners fail to detect the intrusion.

The flocking habit of this species is so strong that a late nest-building pair was regularly followed to the nest tree by one or more goldfinches, usually of the same species but sometimes a Green-backed. After the arrival there would usually be some attempt to drive out the strangers, but these pursuits tended to be mild and not to extend far. Evidently the tendency to join a flock and to follow others in flight prevented the establishment of a rigid habit of isolation for the nesting pair and the exclusion of other members of the species or even of competing members of the same sex.

The incubating female Lawrence Goldfinch remains on the nest almost continuously. She leaves for short intervals after some feedings by the male when the male waits for

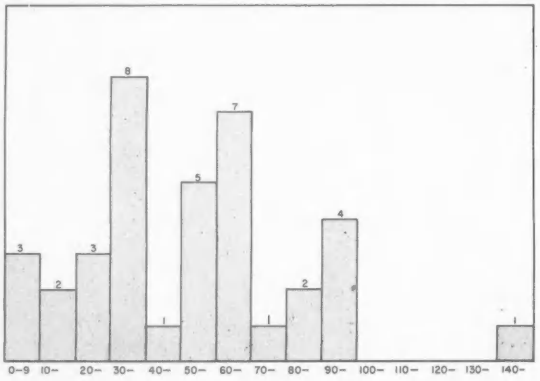


Fig. 45. Frequency occurrence of 37 complete intervals in minutes between visits of a male Lawrence Goldfinch to a nest with young.

her. At a nest where the eggs failed to hatch, the female was still incubating on the fifteenth day after watching started. An observer spent 56 hours at this nest, up to June 11. Altogether the female was off the nest only 27 times for a total of 117 minutes, or only 3.3 per cent of the time. Ten of the trips off the nest were for one minute or less, 7 for 2 minutes, one for 3 minutes, 2 for 5 minutes, 3 for 6 minutes, and one each for 7, 9, 13, and 33 minutes. The last one was late in the period when the attraction for the nest was being lost. All but two of the trips were for less than ten minutes. Sixteen of the trips were made in early morning, before 7:15. Two were between 9 and 10 a.m. and three between 11 a.m. and noon. Six were made in the afternoon between 2 and 6 p.m., with half of these between 4 and 5 o'clock (see fig. 44).

The male made 57 trips to the nest, an average of one per hour. The largest number in one day was 11 in 10 hours. Complete intervals away from the nest numbered 37. The shortest was 3 minutes long and the longest 144 minutes. These intervals showed a clear tendency to be 30, 60, or 90 minutes long. For these lengths, plus or minus 10 minutes, there were 11, 12, and 6 trips, a total of 29, or 68 per cent of all the trips (see fig. 45).

For most of the time the young were in one nest we spent from 9 to 11 hours daily watching their development and care. Although it was not determined for this nest, we assumed that the young birds hatched on July 2 and that they left on the 13th or 14th day after hatching. According to Walkinshaw (Jack-Pine Warbler, 17, 1939:3-11) the female American Goldfinch broods the young through their fourth day in the nest. Possibly our Lawrence Goldfinches hatched on July 3.

Feeding of the young in the nest is at fairly uniform hourly intervals. This might be determined by the time required to gather and prepare the food, and also it might be influenced by the hunger limits on the part of the bird to be fed. Through the 11 days before the two young left the nest on July 14, in 109 hours we recorded 139 feedings by a parent bird. On 19 occasions the male fed the female. These feedings on the first four days numbered 6, 7, 4, and 1, and there was one on the last day. This represents the time required to change from the program of incubation, in which all the food brought to the nest was delivered to the female and she ate it. For a few days after hatching the tendency was for the female to take the food and then deliver it to the young after the departure of the male. The male had great difficulty in reaching past the begging female to get food to the young. When it was no longer necessary for the female to brood the young, she accompanied the male on trips for food. The parents then tended to arrive at the nest together and to take turns in feeding the young. In the early days the male nearly always fed first, but later the female delivered food almost as often as the male did. The male fed the young 69 times; the female, 51 times. On 60 feedings only one parent fed the young. Sixty feedings took place when both parents came to the nest at the same time. The male fed alone 25 times, or one to five times daily. The female fed alone 35 times on seven days. She fed 11 times on the first day, and on the next four days 7, 7, 5, and 3 times. On the trips together the male fed young first on 44 times, but none on the first day; the female fed first 16 times, only twice in the first six days, and 14 times in the last five days.

This brief review of our observations and other evidence indicates how the traits listed earlier fit the Lawrence Goldfinch to occupy the peculiar habitat in which we find it. The type of food and manner of using it are prominent in determining much of the behavior. They appear to exert more rigid, though variable, control over the size of population than is the case with many other kinds of birds. This bird resembles numerous other species in its favorable response to the increased food made available by agricultural use of the land, expecially in arid situations. My conclusion is that the population of Lawrence Goldfinches is greater now than it was before the development of agriculture in its range and that probably its range has been extended somewhat by that development.

*Hastings Reservation, Robles del Rio, California, April 6, 1950.*

# NOTES ON BIRDS OF THE LAKE PATZCUARO REGION, MICHOACAN, MEXICO

By ROBERT B. LEA and ERNEST P. EDWARDS

Because of the diversity of bird life observed by Edwards and Stephen W. Eaton of Cornell University when they visited Lake Pátzcuaro on July 28 and 29, 1946, they considered the region a promising one for study. Further impetus to plans for intensive investigation of the region was afforded by the report of Blake and Hanson (1942) on avifaunal studies in the Rio Tepalcátepec-Cerro de Tancítaro area. Their paper, which emphasized the fact that little published information on the birds of the state of Michoacán was available, serves as an excellent groundwork for further study in the state.

Consequently the Lea-Edwards Expedition with John W. Boehm of Elgin, Illinois, visited Pátzcuaro in the late winter and early spring of 1947, making observations and collecting birds intensively in the region from March 14 to 19 and from April 25 to May 9. The following report, based on 167 specimens of 92 species, also includes mention of 58 species of which we obtained no specimens, but which were observed either by us in 1947 or by Eaton and Edwards during the visit in the summer of 1946.

We found that there were no previously published reports of the occurrence in Michoacán of 48 species of the total of 150 species that we recorded. These are designated in the annotated list by an asterisk placed before the species name. Although almost half of them are based on sight records alone, and many are common birds in similar situations in other parts of the central plateau, we feel that it is worthwhile to give them special mention. R. T. Moore (1945:223) apparently has assembled a collection of several thousand birds from Michoacán, taken by Chester C. Lamb, and it may contain many of the species that we designate as new records for the state, since presumably portions of the collection still remain to be reported upon. Three have been recorded by Moore (1945:231-232) as occurring in his Tarascan Faunal District, which consists primarily of a portion of the state of Michoacán, but also includes some of México and Jalisco.

All of the observations reported herein were made within the region extending from Carapan and the volcano of Parícutin east to Morelia, and from the Mexico City-Guadalajara highway south to Tacámbaro. However, by far the greater portion of the work was done within a few miles of the lake shore inside the boundaries of the Lake Pátzcuaro basin. The surface of the lake is well over 6000 feet above sea level and only once, during a morning's collecting near Tacámbaro at approximately 5000 feet elevation, did we descend appreciably below this level.

The 1947 party entered the Pátzcuaro Lake basin in mid-March by way of Carapan, Cherán, Nahuatzin and Sevina, driving over deep-dusty, rocky roads and ox-trails from Sevina across the mountains to Erongarícuaro, and thence around the west and south shores of the lake to Pátzcuaro. The extensive virgin forests of pine which once supported a population of Imperial Ivory-billed Woodpeckers (*Campephilus imperialis*) (Nelson, 1898:218) were no longer to be found between Nahuatzin and Pátzcuaro, the land having been almost completely cleared for agriculture. Even the mountain tops were covered only with relatively small areas of what appeared to be second-growth pine and oak. *Campephilus imperialis* is undoubtedly completely absent at present from this section of its former range.

The extensive marshes near the southeast arm of the lake received the greatest share of our attention, and we made collections there in March, April and May. The marsh along the lake shore consisted primarily of cattails (*Typha*). Approximately 300 yards

back from the shore another marsh commenced and extended two or three miles to the east along an inlet stream. It consisted mostly of a low grass-like herb, probably *Carex*, interspersed with large areas of *Scirpus* and small patches of *Typha*.

For a few days in March we camped in open pine woods two miles south of Pátzcuaro and made collections there at that time as well as in late April and early May. Edwards investigated a similar area near Ajuno on April 30. The woods included in this category consisted almost entirely of scattered large, long-needled pines with only a few thick-leaved oaks interspersed. The forest floor was grassy and in a few places heavily grown with an irregular shrub-like plant reaching a height of five feet.

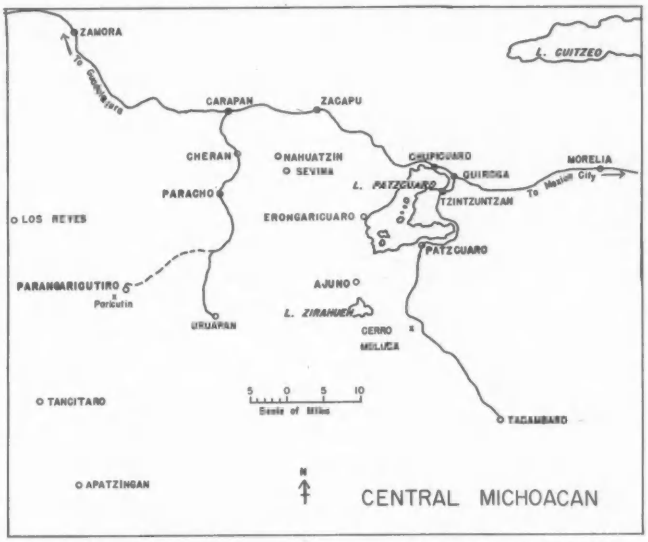


Fig. 46. Map of central Michoacán showing localities mentioned in the text.

In late April and early May we investigated two types of woodland which we had not visited in March. The first, largely a mixture of pine and oak, was the most widespread sort of habitat in the region, excepting the cultivated fields and rocky pastures. There was great variation in the proportions of oak and pine. The woods which we investigated, situated five miles south of Pátzcuaro, and 7600 feet above sea level, contained many oaks and smaller thick-leaved shrubs, with scattered pine trees towering overhead. It was relatively humid within and the substratum consisted of jumbled rocks, presumably an old lava flow. A somewhat similar association at about 5000 feet elevation, approximately three miles north of Tacámbaro, was drier, contained fewer pines and thick-leaved shrubs and grew on a clay soil.

The second type consisted of a dense growth of fir (*Abies*). We studied a small forest of this sort on Cerro Moluca, approximately fifteen miles south of Pátzcuaro at an estimated elevation of 9000 to 9500 feet. A large portion of the forest consisted of almost pure stands of fir of heights up to 100 or 150 feet, but a few park-like openings existed, grassy or grown with shrubs and herbs.

With the exception of a few specimens returned to the Dirección General Forestal

y de Caza, our specimens are now in the personal collection of George M. Sutton. We wish to express our appreciation to Dr. Sutton for his advice and encouragement in all phases of the work. We wish also to thank Mr. Emmet R. Blake and Mr. Stephen W. Eaton for carefully checking the manuscript, and the latter also for allowing inclusion of his field observations. We are much indebted to the authorities of the United States National Museum, the Fish and Wildlife Service Collection, the Chicago Natural History Museum, the Museum of Zoology of the University of Michigan and the American Museum of Natural History for assisting us and placing their collections at our disposal. Much of the work was done as part of a research project at the University of Michigan Biological Station.

Unless otherwise stated, specimens were taken within five miles of Pátzcuaro.

**Aechmophorus occidentalis*. Western Grebe. Edwards saw one April 29 at the north end of the lake.

**Podilymbus podiceps*. Pied-billed Grebe. We saw several in the south and southeast portions of the lake in March, April and May.

**Ardea herodias*. Great Blue Heron. We saw as many as five together in May. In March and April they seemed less common.

*Casmerodius albus*. American Egret. We saw two dozen or more in July, and as many in March, April and May.

**Leucophoyx thula*. Snowy Egret. We saw a few in May.

**Hydranassa tricolor*. Louisiana Heron. A few were present in March, April and May.

*Botaurus lentiginosus*. American Bittern. We saw from one to several in the marshes in March and May.

*Plegadis mexicanus*. White-faced Glossy Ibis. 1 ♂, May 3. We saw Glossy Ibis on every occasion that we worked along the lake shore. They fed in groups of as many as sixty in the shallow water, particularly frequenting the shore of the southeast arm of the lake and pools in the inlet marsh nearby. All were in immature or winter plumage and none showed white face markings. The bare skin around the eye of our specimen varied from gray to pinkish-lavender. If coloration of that exposed area differs in immature *P. falcinellus* and *P. mexicanus* as in the adults of the respective species, our specimen is the latter.

**Anas acuta*. Pintail. Edwards saw two males and a female May 2.

**Anas americana*. Baldpate. This was the most abundant species of duck on the southeast arm of the lake in March, April and May, showing little diminution in numbers by the end of the first week in May. There were probably 400 or 500 individuals.

**Anas discors*. Blue-winged Teal. We saw five in April and May.

*Anas cyanoptera*. Cinnamon Teal. This species was nearly as abundant as the Baldpate.

**Anas clypeata*. Shoveller. We found them rather scarce; never more than one to ten Baldpates.

**Oxyura jamaicensis*. Ruddy Duck. Edwards saw a male and three females May 8.

*Coragyps atratus*. Black Vulture. We saw two or three almost daily.

*Cathartes aura*. Turkey Vulture. This species was equal in numbers to the Black Vulture.

**Buteo albicaudatus*. White-tailed Hawk. Eaton and Edwards saw one near Zacapu July 29, 1946.

*Buteo jamaicensis*. Red-tailed Hawk. We occasionally saw one.

**Circus cyaneus*. Marsh Hawk We recorded the species six times in March, April and May.

**Pandion haliaetus*. Osprey. We saw one near the north shore of the lake April 29.

*Polyborus cheriway*. Caracara. We saw one bird four times in March, April and May.

**Falco peregrinus*. Duck Hawk. Eaton and Edwards saw one July 28, 1946.

*Falco sparverius*. Sparrow Hawk. We encountered a few scattered throughout the area.

**Porzana carolina*. Sora. 2 ♂ ♂, May 3. These birds were moving in and out of the thick *Scirpus* of the shore marsh. One of them made a low grunting sound which we had heard in this marsh previously. Their stomachs contained fine green plant material.

*Fulica americana*. Coot. They were almost as numerous as the Baldpate.

*Jacana spinosa*. Jacana. We saw one in March, one in April and five in May.

**Charadrius semipalmatus*. Semipalmated Plover. Edwards saw one at the south end of the lake April 25.

*Charadrius vociferus*. Killdeer. Edwards saw one May 1.

*Actitis macularia*. Spotted Sandpiper. 1 ♀, April 29. We saw a few April 25 to May 1.

*Himantopus mexicanus*. Black-necked Stilt. We saw flocks of as many as forty individuals from March to May.

**Chlidonias niger*. Black Tern. Eaton and Edwards saw several in immature or winter plumage over the lake July 28.

*Zenaidura macroura*. Mourning Dove. We saw fifty in one day in April and several small groups in March and May.

*Scardafella inca*. Inca Dove. This was the most abundant dove in the region. We saw and heard them daily.

*Crotophaga sulcirostris*. Groove-billed Ani. Edwards saw one in Tacámbaro April 28.

*Bubo virginianus*. Horned Owl. We heard two calling shortly before dawn May 6.

*Chordeiles acutipennis*. Texas Nighthawk. Edwards saw one at dusk April 26, flying through the yards and gardens near the lake at Pátzcuaro.

*Caprimulgus vociferus oaxacae*. Whip-poor-will. 1 ♀, March 16. Individuals were active at night in March, April and May. The bird taken was calling shortly before it was collected. It is closely similar to the type of *oaxacae*, particularly in the decidedly buffy collar and lores and in the strong buffy brown edgings of the black spots. Our specimen differs only slightly from the type in being paler throughout, less definitely spotted below, and having larger and less triangular spots on the crown. It is browner than *arizonae*, especially below, and is considerably more buffy brown than *setosus*.

**Streptoprocne zonaris*. Collared Swift. We saw a flock of approximately eight near Tacámbaro April 28.

*Cynanthus latirostris propinquus*. Broad-billed Hummingbird. 2 ♂ ♂, April 26, 29. The specimens are in immature plumage, showing a few metallic blue feathers on the abdomen. We have no *propinquus* at hand for comparison, but our specimens are darker with less yellowish reflection above than either *latirostris* or *magicus*, and the blue feathers appearing on the abdomen are bluer than in either of those. In comparison with *toroi* both of our specimens are longer billed (exp. culmen 20.5 mm.) and neither shows the dusky or metallic markings of the anterior under tail coverts of that race.

*Hylocharis leucotis borealis*. White-eared Hummingbird. 1 ♂, April 29. The species occurred commonly in a variety of habitats from the flowering trees along the lake shore through open pine woods, the pine-oak woods, and into the high fir forest. Our specimen tends toward *leucotis* in having a short bill (culmen 16.5 mm.) but its long wing (61 mm.) and greater extent of white on the abdomen place it closer to *borealis*.

**Calothorax lucifer*. Lucifer Hummingbird. 1 ♀, April 26. Our only record for the species was at the base of a dry hillside near the lake.

*Trogon mexicanus*. Mexican Trogon. 1 ♂, April 30. We recorded the species often in the pine-oak woods April 30 to May 7. It was conspicuous because of its loud call, which consisted of six or eight notes given in quick succession and ending usually with a cluck. Edwards watched a female in attendance at a nest in the fir forest on May 2. The nest hole was twenty-five feet up in a dead tree trunk.

**Megaceryle alcyon*. Belted Kingfisher. Lea saw one March 18.

*Colaptes cafer*. Red-shafted Flicker. The species was to be seen frequently in all of the woodlands that we studied.

*Balanosphyra formicivora*. Acorn-storing Woodpecker. The species seemed less common than the preceding one.

*Dendrocopos scalaris centrophilus*. Ladder-backed Woodpecker. 1 ♀, March 16. We saw the species infrequently in the open pine woods or feeding in low semi-herbaceous plants near the lake shore. Our specimen closely resembles the type of *centrophilus*, differing only in having a slightly shorter, stouter bill, and slightly wider black barring and brighter white above. It is less heavily spotted below than *azelus* and *bairdi*, and much larger (wing 101 mm.) than the former. It is somewhat darker above and smaller than *cactophilus*.

*Sayornis nigricans*. Black Phoebe. In late April a pair was nesting under the eaves of a house in Pátzcuaro near the lake shore.

**Sayornis saya*. Say Phoebe. 1 ♂, March 17. We noted the species only on March 17 and April 26 in the scrub growth in the dry fields bordering the inlet marsh. The racial affinities of this specimen are not readily apparent. It is considerably darker than pale extremes of the nominate race, and almost perfectly matches some specimens of *yukonensis* except in being slightly browner on the crown. However, we encountered difficulty in finding constant characters to separate *yukonensis* and *saya*.

*Pyrocephalus rubinus*. Vermilion Flycatcher. On April 29 we saw a female beginning nest construction at the north end of the lake, and on July 28 a pair was feeding young in a nest in the lake section of Pátzcuaro. The species was to be seen frequently, particularly around villages where orchards and gardens were cultivated.

*Tyrannus vociferans vociferans*. Cassin Kingbird. 1 ♂, April 30, testes enlarged. We saw this species almost daily along the roads, at the borders of the forests and around the edge of the inlet marsh.

*Myiarchus tuberculifer querulus*. Olivaceous Flycatcher. 1 ♀, May 2. We recorded the species frequently from April 28 to May 7 in the mixed pine and oak woodland, in the fir forest and once near the south shore of the lake. It called rather frequently, a rolling "r-rew pee-r-r-r" or a mournful "whee-oo-oo-o."

**Contopus virens richardsonii*. Wood Pewee. 1 ♀, April 29, Chupícuaro.

*Contopus pertinax pertinax*. Coues Flycatcher. 1 ♀, ovary enlarged, April 28, 1947, Tacámbaro. 1 ♀, July 29, 1946, dead on road near Carapan.

*Empidonax hammondii*. Hammond Flycatcher. 1 ♂, May 6.

*Empidonax difficilis occidentalis*. Western Flycatcher. 1 (sex?), March 16. 1 ♂, April 30, Ajuno. These were our only positive records of the species.

*Empidonax fulvifrons rubicundus*. Buff-breasted Flycatcher. 1 ♀, March 14, Sevina. 1 ♂, April 27. This was the most common flycatcher in the open pine woods. It was conspicuous around our camp in March when individuals were chasing each other about, voicing a variety of calls. It seemed much less active in late April and early May.

*Mitrephanes phaeocercus phaeocercus*. Tufted Flycatcher. 1 (sex?), May 6. Seeming superficially to be the darker and more buffy counterpart of *Empidonax fulvifrons* in the denser mixed woods, this species was recorded with certainty only on April 27 and 30 and May 6 and 7. Edwards found an occupied nest in the fir forest on May 7. It was a cup-shaped structure on a side spur of a dead limb which was hanging almost straight down. The nest was sheltered by the limb and was completely invested with lichens on the outside. Comparative material at hand is inadequate but our specimen agrees closely in coloration, above and below, with one adult male *phaeocercus* from Tancítaro in the Chicago Natural History Museum.

**Eremophila alpestris chrysolaema*. Horned Lark. 1 ♂, testes large, 1 ♀, May 4, Carapan. We noted this species infrequently in the high open fields along the roads. One group near Carapan numbered at least a dozen birds. Here we collected our two specimens and saw two others in flight display, zooming upward, gliding and singing in spiral descent. Both appear to be closest to *chrysolaema*, the female not differing noticeably from a series in the Fish and Wildlife Service collection. The male differed only in having a larger area of cinnamon in the nuchal region and less heavily marked stripes on the back. The male is not as strongly washed with cinnamon buff above as *oaxacae*, particularly on the rump and upper tail coverts, and is darker and duller around the occiput and nape.

**Progne subis*. Purple Martin. 1 ♀, oviduct large, May 2, Cerro Moluca. Over Lake Pátzcuaro and again near a dead tree by the edge of the fir forest on Cerro Moluca we saw as many as a dozen Purple Martins on May 2, 3 and 7. They fluttered about holes in the dead tree, but never entered as we watched. Our specimen is quite dark-bellied, being similar to one Jalisco specimen, one California specimen and two from Florida in the Fish and Wildlife Service collection. Other portions of the plumage agree readily in coloration with a series of the race *subis* and differ markedly from *hesperia* in lacking both the pearly gray throat coloration and the definite whitish collar around the hindneck.

*Petrochelidon pyrrhonota*. Cliff Swallow. We saw groups of nests on houses in the lake section

of Pátzcuaro and watched the birds gathering mud for further construction in late April. We noted the species also near Chupícuaro and the volcano of Parícutin.

**Stelgidopteryx ruficollis*. Rough-winged Swallow. 1 ♂, testes large, May 7. Occasionally we watched individuals of this species feeding in association with *Progne subis* and *Tachycineta thalassina*. On May 2, 4 and 7 we found them active around banks which were favorable nesting sites, and on May 5 we saw several above the old lava flow of the volcano of Parícutin at San Juan de Parangaricutiro. Our specimen shows the large size (wing 116 mm.) and trace of cinnamon coloration on chin and throat characteristic of *fulvipennis* (Brodkorb, 1942:216 = *salvini* of Griscom, 1929:70), but it is by no means a well-marked example. As is to be expected in breeding birds, the light edgings of the tertials are worn off almost completely.

*Hirundo rustica*. Barn Swallow. The species was a common breeding bird in the vicinity of Pátzcuaro. We saw adults feeding young on the nest in late July.

**Tachycineta thalassina*. Violet-green Swallow. 1 ♂, testes large, April 27. 3 ♀ ♀, May 2, Cerro Moluca. Individuals of this species were nesting in the eaves of the houses in April and May. One of the three females taken from a flock at Cerro Moluca proves to be of the race *lepida*. It differs from examples of *thalassina* in its purple upper tail coverts and very small size (wing 107 mm.). The other two females conform well in color with a series of *thalassina* in the American Museum of Natural History and are near the upper limits of this large race in size (wing 114, 115 mm.). The male appears to be intermediate between the Mexican and western races. In color it is typical of *thalassina*, but is considerably smaller than average (wing 118 mm.).

*Corvus corax*. Raven. We saw up to three or four daily in almost every part of the area covered.

*Aphelocoma ultramarina ultramarina*. Mexican Jay. 1 ♀, March 17. 1 ♂, testes large, April 30. Conspicuous and noisy, the species occurred rather frequently in the pine, pine-oak and fir woodlands, usually in small groups. On May 6 we watched a group chasing a Great Horned Owl in the pine-oak woods. No nesting activity was apparent.

*Cyanocitta stelleri purpurea*. Steller Jay. 1 ♀, April 30. We noted the species only twice; Lea collected one of three scolding birds in the pine-oak woods on April 30, and Edwards saw a single quiet individual in the fir forest on May 2.

*Parus sclateri sclateri*. Mexican Chickadee. 1 ♂, testes large, May 7. 1 ♀, May 7. In the pine and fir woodlands the two noted "zee-zee" calls of this species were conspicuous. We heard a few at the edge of the lava flow near the volcano of Parícutin. It was very difficult to place our specimens subspecifically, because of the relatively slight differences between the races. The female appears to be closer to *sclateri* in coloration, however, and although the male tends strongly toward *eidos* in its paler gray coloration it is quite small (wing 65.5 mm., tail 62.5).

*Psaltriparus minimus iulus*. Bush-tit. 1 ♀, ova large, March 17. 1 ♂, April 27. We noted the species occasionally in the pine and pine-oak woods. Our male specimen is closely similar to the type (male) of *iulus*, being much less brownish above than *melanotis* from Veracruz, Oaxaca and Guatemala. Female specimens of *iulus* or *melanotis* were not at hand for comparison, but our female specimen is identical in back coloration to the type of *iulus*. It is darker above than female *lloydi* and buffier below. Ridgway (1904:427) lists Pátzcuaro as a locality for *P. melanotis melanotis*.

*Sitta carolinensis*. White-breasted Nuthatch. We saw less than a dozen during our studies.

*Sitta pygmaea flavinucha*. Pygmy Nuthatch. 1 (sex?) immature, May 6. We recorded the species only on May 6 when we saw a few groups of two to five individuals in the pine-oak woods. Compared with seven *flavinucha* from Tancítaro, Michoacán, three of which are immature, our specimen seems fairly close in color of the nuchal patch and in overall coloration. It is distinctly darker brown below and very slightly darker gray above than a series of adult *chihuahuae* in the Chicago Natural History Museum.

*Certhia familiaris guerrerensis*. Brown Creeper. 3 ♂ ♂, March 17, April 30, May 2. We noted the species occasionally in the pine-oak, pine and fir woodlands. Although the differences are slight our specimens are somewhat darker above and show a more chestnut, less tawny, rump than examples of *jaliscensis* which we examined. They are too small for *alticola*.

**Cistothorus palustris iliacus*. Long-billed Marsh Wren. 2 ♂ ♂, March 18, May 3. 2 ♀ ♀, April 26, May 3. Common in the marshes along the southeast arm of Lake Pátzcuaro. We noted some singing. Without investigating the problem exhaustively we follow the usage of the name *iliacus* as outlined

by Aldrich (1946:131). However, all of the above specimens are much closer to three pale individuals which we examined from the type locality of "*laingi*" than to the darker and more rufescent type of *iliacus*. They lack noticeable barring of the upper tail coverts.

*Campylorhynchus megalopterus megalopterus*. Huitzilac Cactus Wren. 1 ♀, ova large, May 7, Cerro Moluca. Several individuals were noted in the fir forest. They moved about on the spreading branches of large fir trees, somewhat after the fashion of nuthatches. Their rasping calls "di-di-di-dit—di-dit" were voiced frequently. The specimen is less barred above and slightly less brownish than a good series of *megalopterus* from Morelos and Michoacán.

*Campylorhynchus gularis*. Spotted Cactus Wren. 1 ♀, ova large, April 27. Lea observed a pair copulating in the brushy growth near the lake at Chupícuaro April 29. Our breeding female has the short bill (culmen 19.5 mm.) and brownish crown of *gularis*, and we follow Blake and Hanson (1942:539) in considering this group specifically distinct from *jocosus*, although we have not examined immature birds. Specimens from Jalisco, Sinaloa and near the town of Uruapan in Michoacán differ from ours in being less brownish and less striped, while a female from Carricitos, Tamaulipas, resembles our Pátzcuaro specimen much more closely.

*Thryomanes bewickii murinus*. Bewick Wren. 1 ♂, March 18. We noted this species occasionally on the outskirts of the villages, in the pine woods and near the inlet marsh. The birds were singing but we found no nests. In wing length (60 mm.) it tends somewhat toward *percnus*, which Blake and Hanson (1942:540) recorded from Tancítaro, but is less brownish above and has less heavily barred under tail coverts than the type and a series of that race. In coloration it closely resembles a series of *murinus* from Morelos, Hidalgo and México.

*Troglodytes brunneicollis colimae*. Brown-throated Wren. 2 ♂ ♂, May 2. We noted it frequently in early May in the pine-oak woods and the fir forest. This wren was rather secretive in movement, but its song was loud, reminding us of that of the House Wren of the eastern United States. One specimen tends toward *guerrerensis* in lacking a grayish tinge, but appears to be closest to *colimae* in being darker than the former above and below and more reddish on the breast. However, we had no known *colimae* at hand for comparison. The other specimen, taken within a few feet of the first one in the edge of the fir forest, cannot be satisfactorily placed. It seems closest to *brunneicollis* in its reddish cast, but is lighter and more reddish brown than that race. The flanks are very lightly barred and very reddish.

*Catherpes mexicanus mexicanus*. Canyon Wren. 1 ♂, May 3. Common about the houses in the villages, in the dry rocky hills above the lake and in the ruins of the church in Parangaricutiro. We heard them singing in mid-March and found a nest with fully fledged young in late April.

*Toxostoma curvirostre curvirostre*. Curve-billed Thrasher. 2 ♂ ♂, testes large, May 3, 6. 1 ♀, oviduct enlarged, May 2. We noted the species occasionally in the dry hedgerows, cactus growth and dry countryside. It occurred also near Paricutin along the edge of the cold lava flow. The female and the male taken May 3 are close to typical *curvirostre*, but the other male is larger (wing 115 mm., tail 115), more heavily spotted, less buffy below and less brownish above. It is apparently much like specimens taken in the area from northeastern Jalisco to northwestern Guanajuato and Aguascalientes, which were referred to *celsum* by Moore (1941:213), but are characterized by longer wings than typical *celsum*. Since the wing and tail proportions are as in *curvirostre*, however, we prefer to place this bird with our other two breeding specimens in that race.

*Melanotis caerulescens effuticius*. Blue Mockingbird. 1 ♂, April 28, Tacámbaro. We watched a group of twenty individuals in a woodlot three miles north of Tacámbaro. They behaved and sang much in the manner of thrashers, although one of their calls was similar to a call of the Carolina Wren (*Thryothorus ludovicianus*). Edwards saw two near Chupícuaro April 29. The specimen is intermediate between *effuticius* and *caerulescens*, although closer to the former, particularly in dorsal coloration.

*Mimus polyglottos*. Mockingbird. Edwards saw one a short distance west of Erongarícuaro March 14.

*Turdus migratorius*. Robin. 1 ♂, testes enlarged, May 6. We saw this species in the pine and pine-oak woodlands and up to the edge of the old lava flow at the volcano of Parícutin. It became increasingly conspicuous in late April, when we saw individuals carrying nesting material. Our single specimen, a breeding male, is difficult to place, but seems closer to *permixtus* in small size (wing 134

mm.) and blackness of wings and tail. It is far from the dark extreme of *permixtus*, however, particularly in breast coloration.

*Myadestes obscurus*. Brown-backed Solitaire. We heard and saw several in late April and May, in the pine-oak woods and fir forest.

**Hylocichla guttata*. Hermit Thrush. 1 ♂, March 16. We noted this quiet species infrequently in March, April and May in the pine, pine-oak and fir woodlands. Dr. A. H. Miller has kindly identified this specimen, stating that it is "*polionota*—atypical coloration toward *guttata*."

*Catharus occidentalis fulvescens*. Russet Nightingale Thrush. 2 ♂ ♂, testes large, May 6. We heard this species frequently in the pine-oak woods and the fir forest on May 6 and 7. The birds were shy and stayed in the thick undergrowth most of the time.

*Catharus aurantiirostris clarus*. Orange-billed Nightingale Thrush. 1 ♂, April 28. The startlingly loud song of this species became a familiar sound in the hedgerows and shrubbery of the villages. The specimen is slightly darker than the type of *clarus*, but very closely similar to some topotypes.

*Sialia sialis fulva*. Bluebird. 2 ♂ ♂, March 16, May 7. We saw bluebirds commonly in very open pine woods and along the roads and fields in March, April, May and July. All that we examined closely proved to be of this species. Because of the conflicting treatments of *Sialia sialis* by Ridgway (1907) and Griscom (1932), and the inconclusive evidence of the few undeniably breeding specimens at hand, we cannot be sure of the status of Pátzcuaro birds. Our first specimen, azure blue above and light below, is close to *fulva*. But the second bird, while azure blue above, is very dark below, considerably more so than the co-types of *guatemalae*.

**Polioptila caerulea*. Blue-gray Gnatcatcher. 1 ♂, March 18. Recorded only twice, on July 28, 1946, when one was seen in the bottom of the bowl of Cerro del Estribo in company of *Mniotilta varia* and *Sitta carolinensis*, and on March 18 when Lea collected one in the dry growth near the southeast arm of Lake Pátzcuaro. The specimen closely matches the nominate race in lightness and blueness of the crown and back, and is too large for *deppei*. We hesitate to place this specimen with *caerulea*, however, since transients from the eastern United States are so unexpected, and since intermediates between *deppei* and *amoenissima* might be expected to resemble *caerulea* in some instances.

*Regulus regulus aztecus*. Golden-crowned Kinglet. 3 ♂ ♂, May 2, 1 ♂, May 7, testes large. 1 ♀, May 2, ovary large. We recorded the species in the fir forest on May 2 and 7. The sibilant songs and calls were almost constantly to be heard. Wetmore (1941:565) has shown that Lawrence's type of *aztecus* is identical with Guatemalan specimens, and not merely a migrant *olivaceus*. Our good series of breeding birds is closely similar to Wetmore's Guatemalan specimens and readily separable from the other races.

**Regulus calendula*. Ruby-crowned Kinglet. In March and late April we often encountered this species.

**Anthus spinoletta geophilus*. Water Pipit. 2 ♀ ♀, April 26, May 3. We saw individuals in groups of as many as forty in the fields and on mud flats along the southeast arm of the lake, in late April and early May. The specimens are difficult to place but appear to be intermediate between *geophilus* and *pacificus*, somewhat closer to the former. In series the two races seem to be separable on the basis of the more brownish dorsal coloration and more cinnamomeous ventral coloration of *geophilus*, but in his description of this race, Oberholser (1946:388) makes no mention of characters separating it from *pacificus*.

*Ptilogonys cinereus pallescens*. Mexican Ptilogonys. 2 ♂ ♂, April 28, Tacámbaro. We noted the species occasionally from April 27 to May 7 in the pine and pine-oak woods. Edwards found an occupied nest on April 28, which was about thirty feet above ground on a horizontal branch in an oak tree. It was somewhat larger than the nest of *Contopus virens* of the eastern United States, but similar in position, structure, and in being covered on the outside by lichens. An adult sat on the nest.

We have no *pallescens* at hand for comparison, but our specimens are grayer, less brownish than a good series of *cinereus*. Both specimens are no doubt intermediate, and the definitely brownish cast about the head of one places it rather far from typical *pallescens*.

**Lanius ludovicianus mexicanus*. Loggerhead Shrike. 1 ♂, testes large, April 30. We recorded it infrequently along the road to Tacámbaro and in the hills above the lake, in March, April and May.

The specimen is considerably darker than *sonoriensis* dorsally, and the tail is longer, though the rump is not strikingly contrasted with the back. It probably is a first-year bird.

*Vireo huttoni mexicanus*. Hutton Vireo. 1 ♂, May 2. We noted a few May 2, 6 and 7 in the pine-oak woods and in the fir forest.

*Vireo solitarius cassinii*. Solitary Vireo. 1 ♂, March 14, Sevina. 1 ♀, May 6. We saw a few in March, April and May. The specimens are small (wing 73 mm., 72; tail 54.5, 52).

*Vireo gilvus swainsonii*. Warbling Vireo. 1 ♂, May 6. 1 ♀, April 30. Presumably most of the great numbers of *Vireo gilvus* in the region in late April and early May were transients.

*Mniotilta varia*. Black and White Warbler. 1 ♀, April 28, Tacámbaro. Noted infrequently in March, April, May and July.

*Vermivora celata*. Orange-crowned Warbler. 1 ♂, March 16, represents the race *lutescens*. Edwards saw a few in the pine woods March 16 and 17.

**Vermivora ruficapilla ruficapilla*. Nashville Warbler. 2 ♀ ♀, April 29, May 2. The species is a rather common transient in the spring. The specimens, though worn, show the characters of *ruficapilla* well, particularly the dullness of the rump, upper tail coverts and wing coverts.

*Vermivora superciliosa palliata*. Jalisco Warbler. 2 ♂ ♂, testes large, May 6. 1 ♀, ovary large, April 30. We noted the species frequently in the pine-oak woods and occasionally in the fir forest in late April and early May. The song consisted of a dry buzz on one pitch, with no introductory notes.

*Peucedramus taeniatus*. Olive Warbler. 1 ♂, May 6, represents the race *giraudi*. We recorded it in March, April and May; more frequently in the last month. The specimen is large (wing 77 mm., tail 53.5).

*Dendroica petechia*. Yellow Warbler. 1 ♂, April 28, Tacámbaro (*brewsteri*). 1 ♂, testes large, May 3 (*dugesi*). We noted the species frequently near the villages in the spring and summer. Edwards found an occupied nest at Chupícuaro April 29. The breeding race of the Pátzcuaro area appears to be *dugesi*.

**Dendroica auduboni*. Audubon Warbler. 2 ♂ ♂, March 16, 1 ♂, April 30. This species was found in greater abundance in the spring than any other warbler of the Pátzcuaro region.

Two specimens have the small size (wing 75.5 mm., 75) and light coloration of the race *auduboni*. A large, dark male (wing 84 mm.) taken March 16 is referable to *D. a. memorabilis*.

*Dendroica nigrescens*. Black-throated Gray Warbler. 1 ♂, March 17.

*Dendroica occidentalis*. Hermit Warbler. We saw them in groups of small birds in March and late April.

**Oporornis tolmiei*. Tolmie Warbler. We saw two near Tacámbaro April 28.

**Geothlypis trichas melanops*. Yellowthroat. 3 ♂ ♂, May 1, 3, 8. It was common in the shore marsh and we encountered it occasionally in the big inlet marsh nearby, in March, April and May. We first heard it sing on May 3, but singing was not often heard. We found no nests or evidence of territorial behavior. In small size our specimens (wing 59.5 mm., 57, 57) tend somewhat toward *chryseola*.

**Geothlypis speciosa*. Orizaba Yellowthroat. 2 ♂ ♂, March 18, May 3. We saw a few in the shore marsh of the southeast arm of the lake and the nearby inlet marsh, on March 18, April 26 and May 3. The birds seemed to be paired but did not sing often and showed no defense of territory. The specimen taken May 3 has an almost pure black crown as contrasted to the grayish crown of the other. No doubt this is due to feather wear since worn July specimens are black-crowned and less buffy beneath than our fresher specimens.

W. W. Brown states (letter) that two specimens in the American Museum of Natural History which he collected in November, 1910, and labeled as to locality simply "San Mateo, Mexico" were taken in the state of México. Hellmayr (1935:442) lists one specimen collected by W. W. Brown at San Mateo, but presumed that this locality was in the mountains of Veracruz. Doubtless this bird was actually taken in the state of México, near the small town of San Mateo, which is only a few kilometers from Lerma. Although no previous published records for Michoacán exist, there are two Michoacán specimens in the United States National Museum, one from Huingo and the other from Pátzcuaro. The known range at present thus extends through Lerma and San Mateo in the state of México, to Pátzcuaro and Huingo in Michoacán, while the occurrence of the species in Veracruz is doubtful.

*Icteria virens auricollis*. Yellow-breasted Chat. 1 ♂, April 29, Chupícuaro. We noted the species frequently in April and May and once in July. Our specimen has the wing and tail proportions (77.5 mm., 84) and coloration of this race.

*Wilsonia pusilla*. Pileolated Warbler. 1 (sex?), May 7 (*pileolata*). Seen often in late April and early May in all types of habitat except the marshes.

**Setophaga picta*. Painted Redstart. We saw one July 28, 1946, and another April 28, 1947.

*Myioborus miniatus miniatus*. Red-bellied Redstart. 1 ♂, April 27. We noted it commonly in the pine-oak woods and occasionally in the fir forest in late April and early May. The song varied considerably, most frequently being a "chip-chip, witchy-witchy-witchy."

*Ergaticus ruber ruber*. Red Warbler. 1 ♂, 1 ♀, May 2, Cerro Moluca. Next to the Golden-crowned Kinglet this was the most common species in the fir forest in early May. The loud song rendered this warbler the more conspicuous of the two species. One of the song variations could be phrased "chivvy, chivvy, chivvy, hu-r-r-r-r, chiv-chiv-chiv." We saw a few also in the pine-oak woods May 6.

*Basileuterus belli bateli*. Bell Warbler. 2 ♂ ♂, May 6. Recorded in March and May in the pine woods, pine-oak woods and fir forest. They were secretive, but occasionally voiced a low rasping "zi-i-i zi-i-i-it." Although specimens from north-central Michoacán have been assigned to *bateli* by Moore (1946:100), ours seem hardly other than intermediates between *belli* and *clarus* except in slightly longer tail (56.5 mm., 59.5). Our specimens do not show the more golden tinge dorsally and the reduction of black on the sides of the crown attributed to *bateli,* but until further clarification of the problem we place them provisionally with that group.

*Basileuterus rufifrons dugesi*. Rufous-crowned Warbler. 1 ♂, 1 (sex?), April 28, Tacámbaro. We saw this species occasionally in late April and early May in the pine and pine-oak woods. The male is too worn to be placed satisfactorily but the latter specimen appears to be *dugesi*.

**Passer domesticus*. House Sparrow. We saw a few about some of the villages and found a nest with young in a broken street lamp April 26.

*Molothrus ater artemisiae*. Cowbird. 1 ♂, 3 ♀ ♀, March 18. We saw the species frequently in large flocks in March, April and May. In late April some of the birds engaged in courtship antics.

*Cassidix mexicanus*. Great-tailed Grackle. Many frequented the trees in villages.

**Icterus bullockii bullockii*. Bullock Oriole. 1 ♂, March 17. We saw a few others in the pine woods.

*Icterus spurius*. Orchard Oriole. 1 ♂, sub-adult, May 3. In April, May and July we watched males singing in trees and hedgerows near the lake.

*Icterus parisorum*. Scott Oriole. 1 ♂, March 16. 1 ♂, sub-adult, April 29, Chupícuaro.

**Icterus cucullatus*. Hooded Oriole. 1 ♀, April 28, Tacámbaro. We cannot satisfactorily place this specimen. It is much less yellowish, more grayish buffy above and below than any of the known races.

*Xanthocephalus xanthocephalus*. Yellow-headed Blackbird. 2 ♂ ♂, sub-adult, April 29, Quiroga. On all of our visits to the Pátzcuaro region we recorded this species in flocks of a half-dozen or more, sometimes as many as fifty.

*Sturnella magna*. Meadowlark. We saw four on May 3 and May 8 near the southeast arm of the lake. They were singing and calling.

*Tanagra elegantissima rileyi*. Blue-hooded Euphonia. 1 ♀, April 29, Chupícuaro. One other was recorded, in the lake section of Pátzcuaro. We have not seen known *rileyi,* but our specimen differs from an Hidalgo specimen of *elegantissima* in being much less yellowish green above and below, and in having a duller throat patch and slightly duller crown.

*Piranga flava hepatica*. Hepatic Tanager. 2 ♂ ♂, testes large, April 28, 29. 1 ♀, March 17. Eaton and Edwards watched a female feeding a fledgling on the ground at Cerro del Estribo July 28, 1946. The following year we found them rather uncommon in the spring. All of our specimens fall into this race as characterized by Sutton and Phillips (1942).

**Piranga ludoviciana*. Western Tanager. Lea saw three males in breeding plumage April 27 in the pine-oak woods. We saw males and females at Tacámbaro the following day.

**Piranga erythrocephala candida*. Red-headed Tanager. 1 ♀, April 28, Tacámbaro. The specimen, possibly a transient, is even grayer above and less yellowish below than individuals from Sinaloa and Jalisco.

*Pheucticus melanocephalus maculatus*. Black-headed Grosbeak. 1 ♂, March 15. 3 ♂ ♂, testes large, May 6. Singing individuals were common in the woodlands in spring.

*Guiraca caerulea deltarhyncha*. Blue Grosbeak. 1 ♂, April 26. Noted occasionally in April, May and July along the roads and in dry fields. Males were singing in May but did not appear to be paired. Although little comparative material is at hand, it is apparent that our specimen has the straight

culmen and heavy bill of *deltarhyncha* (exposed culmen 18 mm., depth of bill at base 14, depth at nostril 12.5). All *eurhyncha* that we have examined have definitely more curvature.

**Passerina amoena*. Lazuli Bunting. Lea saw several in the undergrowth of the pine woods March 17.

*Carpodacus mexicanus*. House Finch. The species was abundant throughout the region.

**Sporophila torqueola torqueola*. Cinnamon-rumped Seed-eater. 1 ♂, May 1. It was also recorded in the outskirts of Pátzcuaro in July, 1946.

*Spinus pinus macropterus*. Pine Siskin. 1 ♀, ovary large, May 2, Cerro Moluca. We occasionally saw groups of as many as forty. The specimen is similar in size and coloration to two *macropterus* from Tancítaro and one from Pacheco, Chihuahua, in the Chicago Natural History Museum.

*Spinus notatus griscomi*. Black-headed Siskin. 1 ♂, April 28, Tacámbaro. We saw a few in April and one on July 28, 1946. Our specimen is large (wing 71 mm.) and bright.

**Spinus psaltria psaltria*. Arkansas Goldfinch. 2 ♂ ♂, April 29, May 3. We saw groups of as many as twenty individuals in the dry fields near the lake on April 29 and May 3.

*Atlapetes pileatus pileatus*. Rufous-capped Atlapetes. 1 ♂, testes large, May 2, Cerro Moluca. We encountered it occasionally in April, May and July in the undergrowth of the pine-oak woods and fir forest, and near the volcano of Parícutin. The specimen is near the upper limit for *pileatus* in size (wing 67.5 mm., tail 72), but tends toward *canescens* in having distinctly olive-gray instead of olive-brown upper parts. Since we have no *canescens* at hand, the placement of the specimen must remain tentative.

*Atlapetes torquatus virenticeps*. Green-striped Atlapetes. 1 ♂, testes large, May 2, Cerro Moluca. Edwards saw a few of these secretive birds in the thick undergrowth of the fir forest on May 2 and 7.

We have no specimens of *colimae* or *verecundus* for comparison, but our specimen is close to four *virenticeps* from Tancítaro in dorsal and ventral coloration. In long tail (90.5 mm.) and large bill (exp. culmen 17 mm.) it is closest to *virenticeps* also, but tends toward *verecundus* in length of wing (82.5 mm.).

*Pipilo ocai nigrescens*. Collared Towhee. 5 ♂ ♂, 4 ♀ ♀, gonads large, March 17, April 27, 30, May 2, 7, Ajuno, Cerro Moluca, Pátzcuaro. The species was common in the woodlands and hedgerows. Singing activity was at a peak in late April. One bird which Lea collected as it was singing proved to be a female. Some of our specimens have buffy brownish flanks or obscure spotting on the tail, and two have all black crowns. Others have olive flanks and restricted chestnut crown patches. One has almost no visible white on the throat. None has noticeable black dorsal streaks.

*Pipilo fuscus fuscus*. Brown Towhee. 2 ♂ ♂, testes large, April 29, May 3. This species was common during the spring and summer in the villages, along the roads and hedgerows and in the edge of the old lava flow near the volcano of Parícutin. Edwards found a nest with eggs April 27.

*Oriturus superciliosus*. Striped Sparrow. We saw a few in the open pine woods at 7000 feet elevation.

*Passerculus sandwichensis*. Savannah Sparrow. 1 ♂, March 18, referable to *anthinus*. 2 ♀ ♀, March 17, May 3, appear to be *P. s. nevadensis*. The form *brunnescens* is represented by the following material: 1 ♂, testes large, May 3. 1 ♂, testes large, May 8. 3 ♀ ♀, May 3. This sparrow was common in the fields close to the lake shore, where we heard many singing in April, May and July. The song was similar to that of our eastern United States bird except that a quick descending "tittle-dur" replaced the final trill. The bright yellow of the superciliary stripe was prominent in the field.

Our specimens were compared with the type of *brunnescens* and the slight differences noted we attribute largely to wear. After examination of many breeding and wintering birds of the Mexican plateau we feel that *brunnescens* is a dark brown Savanah Sparrow with a bright yellow superciliary line in reasonably fresh plumage, somewhat resembling *wetmorei* of Guatemala.

*Chondestes grammacus*. Lark Sparrow. We saw a few along the highway on the east side of the lake in March and April.

*Aimophila rufescens subvespera*. Rusty Sparrow. 1 ♂, April 28, Tacámbaro. This is a pale, long-tailed bird (wing 73.5 mm., tail 80) which we assign to *subvespera* because of the black in the rufous crown stripes.

*Aimophila ruficeps fusca*. Rufous-crowned Sparrow. 1 ♂, April 29, Chupícuaro. We saw this sparrow occasionally in the brushy growth on dry hillsides and fields in April and May.

*Junco phaeonotus australis*. Mexican Junco. 1 ♂, March 16. Noted frequently in the forests and along the roads in spring and summer. Individuals were singing in late April and early May in the pine-oak woods and fir forest. Our specimen is brighter and more extensively red on lower back and tertials than four *phaeonotus* from Nuevo León and five *australis* from Tancítaro.

*Spizella passerina*. Chipping Sparrow. 1 ♂, testes large, May 1. 1 ♀, May 1. We saw the species in large flocks in late April and May, and saw adults feeding young out of the nest July 28, 1946. Our specimens, apparently a pair, are closely comparable to the type and a good series of the race *mexicana*. They probably represent the breeding population of the Pátzcuaro area. One unsexed bird taken April 29 at Chupícuaro appears to represent *arizonae*.

**Spizella pallida*. Clay-colored Sparrow. 1 (sex?), March 18. We saw a few flocks in the dry pastures near the lake.

**Zonotrichia leucophrys*. White-crowned Sparrow. Edwards saw two or three in the outskirts of Pátzcuaro April 26.

**Melospiza lincolnii lincolnii*. Lincoln Sparrow. 1 ♂, April 29, Chupícuaro. We saw a few along rock fences and woods borders in March, April and May. We are indebted to Dr. Alden H. Miller for his identification of this specimen.

*Melospiza melodia adusta*. Song Sparrow. 4 ♂ ♂, testes large, April 26, May 8. 1 ♀, April 26. We saw the species frequently in the shore marshes and the big inlet marsh in March, April, May and July. The birds were paired in late April and sang often, but we did not find any nests. All of these topotypes show the very rusty brown dorsal coloration which characterizes *adusta*.

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*Northwestern University Medical School, Chicago, Illinois, and Laboratory of Ornithology, Cornell University, Ithaca, New York, April 22, 1949.*

# FROM FIELD AND STUDY

**Longevity Record of Gambel White-crowned Sparrow.**—An immature Gambel White-crowned Sparrow (*Zonotrichia leucophrys gambelii*), band number 41-80551, was originally banded by me at my home in Altadena, California, on November 22, 1942. This same bird returned most recently on March 5, 1950, having at that time attained a proven life of almost eight years.

After its original capture, the bird repeated at my banding station 12 times until March 18, 1943. It returned on December 12, 1943, and repeated once, on January 3, 1944. It returned on November 26, 1944, with no subsequent repeats that season. It again returned December 8, 1945, and was recaptured three times during the ensuing 40 days. The next return, on November 19, 1946, was followed by 23 recaptures ending February 9, 1947. Its fifth return was on December 14, 1947, followed by five repeats until April 18, 1948. The last two returns, on January 9, 1949, and March 5, 1950, were single captures in each season.

Out of 848 birds of this species banded between the fall of 1941 and the spring of 1946, this is the only individual with a proven length of life of over five years.—FRANKLIN G. CRAWFORD, *Altadena, California, May 31, 1950.*

**Voice Differences Between Sexes in the American Coot.**—The American Coot (*Fulica americana*) exhibits no sexual dimorphism in plumage characters and although the males average about seven per cent larger than females (Engels, Jour. Morph., 62, 1938:599-607), this size difference is usable in the field only when both members of a pair are observed side by side. Otherwise, reliable size comparisons can not be made. I have found, however, that the sexes can be recognized by differences in voice.

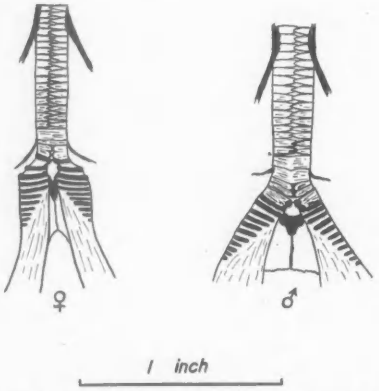


Fig. 47. Sexual dimorphism in the structure of the syrinx of the American Coot.

Soon after commencing a study of the breeding behavior of two pairs of coots on Jewel Lake, Tilden Regional Park, Contra Costa County, California, I noticed that the smaller birds uttered a series of notes quite different from those given by their larger mates. As the study progressed, it became necessary to mark the birds with neck dangles in order that individual birds could be distinguished. With this marking, and a series of measurements to confirm the apparent size differences, it was definitely established that a consistent difference existed between the notes of the large and small birds.

With the difference proved, it became necessary to ascertain which sex gave which series of calls. This was accomplished by confining a flock of coots on a small pool on the University of California campus at Berkeley. Some of the confined birds were sexed by means of a laparotomy and tagged with neck dangles, while other tagged birds were observed and later killed and sexed. In all, about

50 birds have been confined in this study. In addition, ten birds, sexed internally and tagged, were released in natural populations.

Subsequent observations on these tagged birds of known sex, both in the field and in captivity, have shown the original observations to be correct and that sexes can be distinguished in the field with complete accuracy on the basis of voice.

Anatomical studies of more than 60 birds, about evenly distributed for sex (but of unknown age), have shown a consistent difference in the size and shape of the bronchial syrinx characteristic of this species. The accompanying diagrams (fig. 47) illustrate these differences.

The voice differences are less readily indicated. Basically, the female gives a call with a nasal quality whereas the male note invariably lacks the nasal quality. Generally the female calls are at a somewhat lower pitch than the corresponding male notes.

The most readily distinguished notes are their "attention" and "challenge" notes. The former consist of the clear *puhlk* of the male and the nasal *poonk* of the female. The latter consist of a crowing *kuh-kuh-kuk* from the male and a cackling *cack-ka, cack-ka* from the female. On other occasions the male gives a single *puhk-uh* or a *puhk-uh, puhk-uh, puhk-up, uhk, uhk,* the female a *punk-unk.* During times of tension the male gives a nervous *puhk-cow-ah* while the female gives a *coo-ah.* Other notes have been recorded, a few of which have not been well enough studied to determine the corresponding note of the other sex. However, these least known notes are seldom given, or are given only in connection with courtship or care of the young.

In no instance has the same note been heard from both birds of known pairs nor have I wrongly identified notes of birds whose sexes later were determined.—GORDON W. GULLION, *Museum of Vertebrate Zoology, Berkeley, California, April 5, 1950.*

**A New Race of Mountain Chickadee from the Utah-Idaho Area.**—Comparison of several series of the Mountain Chickadee (*Parus gambeli*) collected by the writer in recent years in Utah with specimens on loan from surrounding areas has led to the conclusion that the population of Utah, southern Idaho and southwestern Wyoming differs from those of *P. g. inyoensis* of the Great Basin to the west, *P. g. grinnelli* to the north, and *P. g. gambeli* of the Rocky Mountains to the east and southeast. This population may be described as follows:

**Parus gambeli wasatchensis,** new subspecies

*Type.*—Adult male, no. 9203, Univ. Utah Mus. Zool., taken at Silver Lake Post Office (Brighton), 9,000 feet, head of Big Cottonwood Canyon, Wasatch Mountains, Salt Lake County, Utah, on September 29, 1946; collected by William H. Behle, orig. no. 2985.

*Subspecific characters.*—Closest to *P. g. inyoensis* but distinguished from that race by having the dorsum a darker color with a less grayish tone. Compared with *P. g. gambeli,* dorsum paler, less brownish; bill longer, narrower and more tapering. Likewise differs from *P. g. grinnelli* in having the dorsum lighter, with the bill longer, narrower and more attenuated.

*Measurements.*—Twenty-seven males: wing 73.3-67.7 (70.4), tail 68.7-59.7 (63.7), bill length from nostril 9.4-8.0 (8.5), depth of bill at base 4.0-3.0 (3.5), width of bill at anterior margin of nostril 4.4-3.2 (3.8). Twenty-four females: wing 69.0-64.5 (66.6), tail 65.8-58.4 (60.8), bill length from nostril, 9.2-8.0 (8.5), depth of bill at base 4.4-3.0 (3.3), width of bill at anterior margin of nostril 4.5-3.2 (3.7).

*Geographic range.*—The mountains of central and southern Idaho, southwestern Wyoming and all of Utah except along the western margin of the state.

*Specimens examined.*—IDAHO. Valley County: 5 miles east Warm Lake, 7,000 feet, 1 (July); 5 miles west Cape Horn, Sawtooth Range, 1 (July). Adams County: 3 miles west Payette Lake, 5,400 feet, 3 (July). WYOMING. Uinta County: Fort Bridger, 6,700 feet, 1 (September). UTAH. Summit County: Smith Morehouse Creek, Weber River, 1 (October). Duchesne County: 4 miles up Brown Duck Canyon, northwest Moon Lake, 9,000 feet, Uinta Mountains, 2 (September). Uintah County: head of Ashley Creek, 9,500 feet, near Trout Creek Park, 20 miles northwest Vernal, 6 (September). Davis County: Bountiful Peak Picnic Ground, 8,500 feet, Head of Farmington Canyon, 1 (November). Salt Lake County: Silver Lake P. O. (Brighton), 8,750 feet, head of Big Cottonwood Canyon, Wasatch Mountains, 23 (June, August, September); Bell's Canyon, 7,800 feet, 18 miles southeast

Salt Lake City, 1 (September). Kane County: Duck Creek Ranger Station, 8,600 feet, 22 miles southeast Cedar City, 12 (June); Red Canyon, 5,700 feet, 6 miles north Kanab, 4 (December); Tinny Canyon, 5,400 feet, 4 miles northwest Kanab, 3 (September-December); Kaiparowits Plateau, 7,000 feet, 2 (August).

*Remarks.*—In accord with its central geographic position, this new race has color characters that are intermediate between the races *inyoensis* and *gambeli*. The total aggregate of features of *wasatchensis*, however, shows closer affinities with the former, for the Utah population has the same size as *inyoensis* as well as the same type of slender, attenuated bill. It differs in being darker on the flanks and back. *Wasatchensis* is not so dark, however, as is *gambeli* and further differs from that form in bill characters, the bill of *gambeli* being shorter, wider and deeper at the base, thus giving the general impression of being stubbier. The races *gambeli* and *grinnelli* are very close in their characters, the latter being darker, perhaps, on the back. Thus, *wasatchensis* differs from *grinnelli* in essentially the same way as it does from *gambeli*.

As compared with the extensive range ascribed to *gambeli*, this new race has a relatively restricted range and on its fringes intergrades with all surrounding races. The chickadees of the mountain ranges of western Utah, namely the Pine Valley, Deep Creek and Raft River mountains, are intergrades between *wasatchensis* and *inyoensis* although on the whole closest to the latter. The northern limits of *wasatchensis* are seemingly reached in central Idaho, intergradation with *grinnelli* occurring to the north until *grinnelli* in typical form occurs in Kootenai and Bonner counties. Breeding specimens from 5 miles east of Warm Lake and 5 miles west of Cape Horn, Sawtooth Range, Valley County, and 3 miles west of Payette Lake, Adams County, are still referable to *wasatchensis* even though they are intergrades toward *grinnelli*. Farther east the chickadees are intergrades toward either *grinnelli* or *gambeli*, since it is not clear where the latter two races are best divided. A single worn specimen from 3 miles northwest of Victor, Teton County, and 5 in fresh fall plumage from near Ashton, Fremont County, are dark but have longer bills than *grinnelli* or *gambeli* and are thus seemingly closest to *wasatchensis*. A single August specimen from Green River Lakes, Sublette County, Wyoming, is also intermediate with a shorter bill closest to the average condition of *gambeli* or *grinnelli*.

Three September birds from near Saratoga, Carbon County, Wyoming, and one from Centennial, Albany County, Wyoming, are *gambeli*. Specimens from the Uinta Mountains in northeastern Utah and a fall straggler from nearby Fort Bridger, Wyoming, are *wasatchensis* in typical form. Probably *wasatchensis* and *gambeli* intergrade along the mountains of central eastern Utah and western Colorado, for a few birds from the La Sal Mountains are browner than typical *wasatchensis* and have stubby bills, thus suggesting *gambeli*.

Concerning the southern limits of the range of this new race, the chickadees from the Cedar Breaks area in southern Utah are clearly *wasatchensis*. A blending, however, occurs with *gambeli* in northern Arizona as indicated by a few worn specimens from Navajo Mountain and Mt. Trumbull. A series of fall-taken chickadees from the San Francisco Mountains are closest to *gambeli*.—WILLIAM H. BEHLE, *University of Utah, Salt Lake City, Utah, March 20, 1950.*

**Eastern Phoebe in San Diego County, California.**—A "different" phoebe first seen at Catfish Cove, Henshaw Lake, northern San Diego County, California, October 26, 1949, was tentatively identified as an Eastern Phoebe (*Sayornis phoebe*) by Mrs. Sidney S. Doner of Escondido, California, on October 29, 1949, and positively identified by Mrs. Doner and myself November 23, 1949. The bird had not been seen in the area on the preceding October 15th and 25th. It was seen on eight days during the two-month period from October 26 to December 26 and observed carefully seven times for periods of three hours or more from noon until mid-afternoon. On January 3, 1950, it was absent. According to Grinnell and Miller (Pac. Coast Avif. No. 27, 1944:252), the Eastern Phoebe is a casual visitant in California.

An attempt was made to study the bird in its unusual wintering area. Most interesting was its relation to the resident Black Phoebe (*Sayornis nigricans*). On November 3, the Eastern Phoebe followed and associated with the Black Phoebe as closely as a fledgling does with a parent bird. It was so active as to make the Black Phoebe appear lethargic. It called "phe-be" almost constantly.

On November 6 we found the association weakened. The Eastern Phoebe followed the Black but not closely nor as often as in our first observation period. It called less persistently. It perched motionlessly for intervals. On November 11 the two phoebes associated together in the same manner

as the preceding time. During this observation period we saw the Eastern Phoebe follow a Say Phoebe (*Sayornis saya*) in flight but not closely. After this date, we saw no association with Black or Say phoebes, although both were in the area. The Eastern Phoebe's absences for twenty-minute intervals and longer and also its use of more distant perches were also noted as changes in behavior.—ELEANOR GUYER BEEMER, *Pauma Valley, Pala, California, March 16, 1950.*

**Additions and Corrections to the Check-list of Idaho Birds.**—The Check-list of the Birds of Idaho (Arvey, Univ. Kansas Publ., Mus. Nat. Hist., 1, 1947:193-216) has been found to have certain errors, and although this article is not intended as a revision of that paper, it may serve to rectify those errors and to clarify the status of some forms from data obtained by additional field work. I am grateful to Dr. Pierce Brodkorb and to Mr. Thomas D. Burleigh for suggestions in regard to this paper.

*Accipiter gentilis striatulus*. Goshawk. This bird should be classed as a year-round resident of Idaho rather than as a winter visitor. I found Goshawks breeding in both Custer and Blaine counties in 1948.

*Archilochus alexandri*. Black-chinned Hummingbird. I observed this bird in the breeding season of 1948 along the Portneuf River in Bannock County and it is, therefore, to be expected at least locally in both southern and northern portions of the state rather than in northern Idaho only.

*Tyrannus tyrannus*. Eastern Kingbird. This species nests commonly in at least southeastern Idaho instead of being "casual" in this area. It may be found along most stream beds, or in cultivated areas near farms. I have found it nesting in southwestern Idaho but not so abundantly as in the southeast.

*Certhia familiaris montana*. Brown Creeper. The race *montana* may be added to the state list, in addition to *caurina*, on the basis of five specimens obtained 7 miles west of Yellowstone, Fremont County, Idaho, by L. L. Sandidge, in August, 1949. Specimens obtained by me in 1948 in Custer and Blaine counties show characters intermediate between the two forms, *caurina* and *montana*.

*Vireo huttoni huttoni*. Hutton Vireo. This bird was listed by me as resident in Idaho. The specimen listed, however, was originally misidentified, and no specimen of this species has been taken in Idaho to my knowledge. The species must therefore be dropped from the state list.

*Vermivora virginiae*. Virginia Warbler. A record of this warbler was erroneously reported by me (Condor, 51, 1949:150) as the first for Idaho; the bird had been previously reported by Brodkorb (Auk, 55, 1938:125) from Bear Lake County. The specimen obtained in Bannock County by me is the first for that county, but the third from the state. No doubt Virginia Warblers will be found breeding in more areas of southern Idaho through more extensive field work.

*Spizella arborea ochracea*. Tree Sparrow. This species is not, according to present data, a resident of Idaho, but should be classed as a migrant, since it nests farther to the north in British Columbia. The nest and eggs indicated in the Check-list (*op. cit.*) were actually those of *Spizella passerina arizonae*, as indicated in my field notes, and were transcribed incorrectly as those of *Spizella arborea*. —M. DALE ARVEY, *Department of Zoological Sciences, University of Oklahoma, Norman, Oklahoma, March 2, 1950.*

**Dusting by the Merlin (Falco columbarius).**—About 5 p.m., on June 13, 1948, we were en route along the Alaska Highway near Mile 101 (British Columbia) when we observed a Merlin (*Falco columbarius*) taking a dust bath in the road. Although I was not able to observe the details of the act in the short time between our coming upon the scene as we rounded a bend in the road and the bird's flying to a tree alongside the highway, the general action seemed to be the same as for a gallinaceous bird. Dr. Richard M. Bond suggests that I refer also to the fact that Prairie Falcons (*Falco mexicanus*) are known to dust, since this may not be widely known. The Peregrine Falcon (*Falco peregrinus*) is known to be a water bather.—LEONARD WING, *Texas A. and M. College, College Station, Texas, March 14, 1950.*

# NOTES AND NEWS

The frontispiece of this issue shows the Rose-throated Becard (*Platypsaris aglaiae*) as painted by Andrew Jackson Grayson. This colored plate appears through the generosity of E. W. Mudge, Jr.

Grayson painted the Becard in January, 1865, in the course of a visit to Tres Marias Islands. He writes, "About the last day of my hunting in the Tres Marias, and when I had almost dispaired of finding any new birds in that locality, this interesting one suddenly made its appearance before me in the thick woods that border the hills and steep barrancas of the island. It was very tame and unconcerned at my presence—darting and snapping at flies—also searching for insects, among the leaves and branches of the underbrush, *unlike the true flycatchers*. The same day and near the same place as if sent especially for my collection, I was so fortunate as to secure two others—one female—and these were the only three I had met with."

The Becard is a member of the family Cotingidae, closely related to the American flycatchers, family Tyrannidae. The flowering plant shown in the frontispiece is *Guaicum ?coulteri* Gray, a member of the family Zygophyllaceae, and is known locally as guayacán.

At the meeting of the American Ornithologists' Union in Minneapolis and St. Paul, October 9 to 13, 1950, the following officers were elected: Josselyn Van Tyne, president; Alden H. Miller, first vice-president; Ludlow Griscom, second vice-president; O. S. Pettingill, secretary; R. Allyn Moser, treasurer; Harvey I. Fisher, editor; Walter J. Breckenridge, George H. Lowery, Frank A. Pitelka and L. L. Snyder, new council members. Alexander F. Skutch was awarded the Brewster Medal for his work on life histories of Central American birds. Newly elected Fellows were: W. J. Breckenridge, Maurice Brooks, Harvey I. Fisher, William Rowan, Aretas A. Saunders, Alexander Sprunt, and Winsor M. Tyler. Twenty-five members were elected, as follows:

Anders H. Anderson, Rollin H. Baker, William J Beecher, Charles H. Blake, Ben B. Coffey, Jr., James F. Denton, Alexander D. DuBois, Mary M. Erickson, E. Thomas Gilliard, Horace Groskin, William H. Marshall, Harold F. Mayfield, Gale Monson, Karl Plath, Fred J. Pierce, Hustace H. Poor, Kenneth Racey, William F. Rapp, Jr., W. Austin Squires, Walter P. Taylor, Melvin A. Traylor, Ruth H. Thomas, Arthur B. Williams, Cecil S. Williams, and Angus M. Woodbury.

In 1951, the Union will meet in Montreal.

By recent action of the Board of Directors, annual dues for regular membership in the Cooper Ornithological Club have been raised from three to four dollars. The subscription rate is now five dollars. Sustaining membership remains at five dollars.

## COOPER CLUB MEETINGS

### SOUTHERN DIVISION

MAY.—The annual outdoor meeting of the Southern Division was held May 21, 1950, at Tapia Park. The following names were proposed for membership: Paul H. Oppmann, 13330 Detroit Ave., Lakewood, Ohio, by W. L. Chambers; Perna Marie Stine, R.R. No. 5, Olney, Illinois, by John T. Wright; and Jane Anne Westfall, 918 Hough St., Lafayette, Calif., by J. R. Arnold.

The meeting was devoted to informal discussion.—DOROTHY E. GRONER, *Secretary*.

### NORTHERN DIVISION

SEPTEMBER.—The regular monthly meeting of the Northern Division was held in Room 2503 Life Sciences Building, University of California, Berkeley, on September 7, 1950. The following names were proposed for membership: Phillip C. Dumas, Museum of Natural History, Oregon State College, Corvallis, Oregon and M. Dale Arvey, Dept. of Zoological Sciences, University of Oklahoma, Norman, Okla., both by A. H. Miller; Mrs. Gail Baumgarter, Austin, Nev., and Mrs. O. M. Patterson, Box 2, Pima, Ariz., both by F. A. Pitelka; William W. Pope, 308 Laurel St., San Francisco 18, Calif., by Mrs. R. P. Hastings; Mrs. W. I. Otis, 6067 Rockridge Blvd., Oakland, Calif., by Mrs. M. Voge; Chester M. Fennell, 21475 Hillsdale Ave., Fairview Park 26, Ohio, by K. L. Dixon; William Kisher, Box 346, Sacramento, Calif., by H. L. Cogswell; Terrence J. Merkel, 2050 Fell St., San Francisco 17, Calif., by R. T. Orr; Mrs. J. A. Berry, 85 Menlo Place, Berkeley 7, Calif., by J. M. Kelly; Laurence J. Resseguie, 98 Ramona Ave., Piedmont 11, Calif., by L. C. Taylor; Frederick W. Loetscher, Jr., 507 West Main Street, Danville, Kentucky, by R. W. Storer. Harry Harris was unanimously elected to Honorary Membership.

Mrs. Junea W. Kelly spoke on her experiences while attending the Tenth International Ornithological Congress in Sweden.—HENRY E. CHILDS, JR., *Secretary*.

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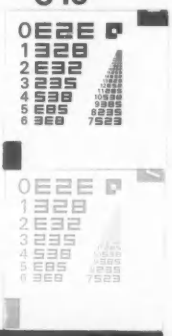
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